

# ***Way to Go, Seattle!***

## **'One-Less-Car' Demonstration Study**



**Final Report  
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# EXECUTIVE SUMMARY

## "One-Less-Car" Demonstration Study

### Results from the "One-Less-Car" Study *what 86 households did in just 6-9 weeks!*

- Households saved an average of \$70 per week.
- All households realized they could live with "one-less-car" and have the mobility they need.
- Reduced 41,463 miles of SOV trips, which is almost enough to drive around the earth *twice!*
- 8,003 fewer drive-alone car trips in Seattle neighborhoods.
- 30,198 pounds fewer CO<sub>2</sub> emissions - if you convert the pollution not emitted into a volume measure it can be visualized as 15 six-lane swimming pools full of pollution.
- 1 in 5 even sold their "extra" car after the study.
- Reduced SOV miles by 22%.\*
- Increased transit use mileage use by 125%.\*
- Increased walking mileage by 38% and biking mileage by 30%.
- Households recognized they could save an average of over \$4,000 per year if they didn't own their second car.
- All households commented that they will make more conscious transportation choices in the future.

\* these figures from the Fall 2002 round of the study

**Way to Go, Seattle!** is an umbrella for the City of Seattle's innovative programs with multiple but simple objectives - improving personal mobility, reducing personal costs, and increasing productivity of the City's existing transportation system. These goals are achieved by showing people they can save money and have more livable communities by making more thoughtful choices about how they get where they want to go.

**Way to Go, Seattle!** strives to find creative ways to reduce the number of drive-alone car trips on the transportation system, a practice commonly referred to as Transportation Demand Management, or TDM.

### What Is It?

One of the signature programs operating under the **Way to Go, Seattle!** umbrella has been the **"One-Less-Car" Demonstration Study**, which aimed to:

- 1) decrease trips and miles driven in single-occupant vehicles (SOVs),
- 2) raise household awareness about the true costs of owning and operating cars,
- 3) encourage more thoughtful transportation choices where citizens more effectively use the full range of transportation modes and choices available, and
- 4) reduce and quantify vehicle miles traveled (VMT) and pounds of CO<sub>2</sub> emissions reduced during the project.

Building on the successes of previous energy and water conservation campaigns, the **"One-Less-Car" Demonstration Study** developed a new conservation model for transportation with the overall goal of supporting city residents in considering the impacts of the methods they use to get around. We encourage people to see transportation as a resource that should be conserved by behavior changes which can also save them money and make a big impact when made collectively.



Bobbie and her son are devoted bus riders since selling their second car as a result of the *Way to Go* project. "I think we're happier and healthier for it."

### **Why Do It?**

Because in the long run, fewer drive-alone car trips result in public benefits of cleaner air, less neighborhood traffic and 'wear and tear' on streets, less land devoted to parking that can then be available for more desirable uses, and better use of the transportation system (e.g. using the best mode or choice available for a particular trip instead of habitually jumping into the car). Driving is responsible for over 60% of the pollution in the Northwest which contributes to global warming in the form of carbon monoxide emissions. Travel surveys have shown that approximately 80% of all daily trips are for non-work related purposes, and it comes as no surprise that we are as frustrated by traffic on the weekends as we are during weekday peak commute hours. In some parts of the country, households spend more per month on the cost of transportation than on groceries, and the costs of owning one or more cars takes a disproportionate toll on a family's income, especially in lower-income households. The **"One-Less-Car" Demonstration Study** is a cost-effective test that determined how receptive Seattle residents are to making more thoughtful choices about how they get where they go.

### **How Does It Work?**

The **"One-Less-Car" Demonstration Study** offered households information and financial incentives to help them reduce their car use and try other means of transportation, and to rethink the way they use their car for all their trips including commuting to work, running errands, and going to entertainment. We conducted a total of three rounds of the Study in Fall 2000, Spring 2001, and Fall 2002. Altogether a total of eighty-six households in Seattle agreed to stop using one of their cars for either six or nine weeks, and keep a diary of where they went and how they got around during that time. Many types of households from a wide range of Seattle's neighborhoods were represented: single people and couples - both with and without children, roommates and relatives, renters and homeowners, and young and old.



"The weekends were the hardest, with two kids and two soccer games to get to. But we just had to talk about where we needed to go and how we were going to accomplish the day's tasks."  
- Sharon

Participating households received a weekly stipend to compensate them for the extensive data they recorded, the public resources they saved, and for their input and help in identifying barriers and incentives to automobile trip reduction, particularly non-work related trips. The stipend also served as an economic incentive which simulated the savings they would have in their pocket if they really did not own the car they parked. The stipend averaged \$85 a week (\$4,420 per year), the amount of money the average second car costs to own and operate (this figure includes all costs such as registration, insurance, maintenance, gas, and parking).

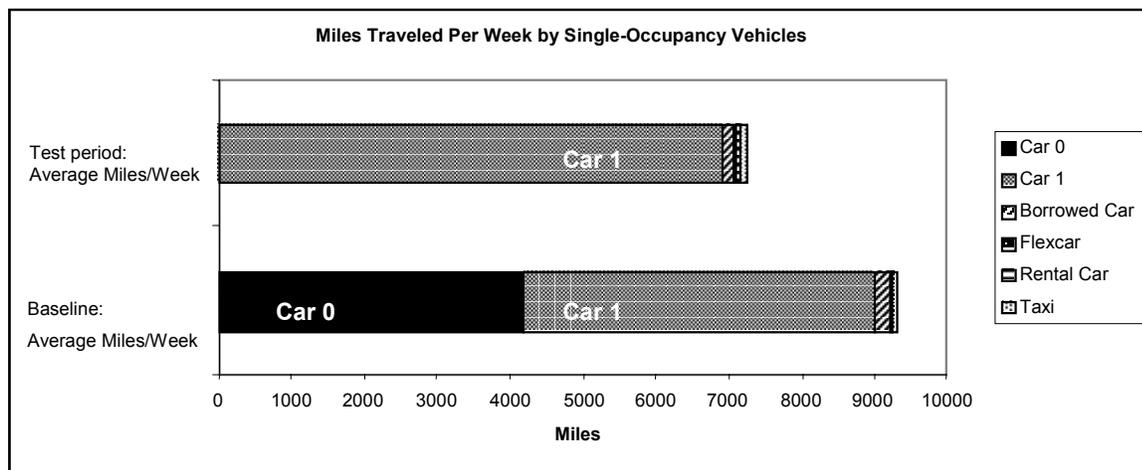
### **What Were the Results?**

Although the sample size of eighty-six participant households is too small to be statistically significant, the data reveals intriguing trends. The collective behavior of the participant households changed. They reduced drive-alone car miles traveled and trips made while increasing the number of miles traveled and trips made using non-drive-alone car modes (such as busing, biking, carpooling, and walking). The Study identified a number of factors that helped people make the behavior change: people's increased awareness about their actual car costs, education about the full variety of travel options available to them, and an immediately tangible economic incentive for not driving their "extra" car.

Many households were able to give up one of their cars with relative ease by biking, busing, carpooling, car-sharing, taking taxi rides, walking, and consolidating trips more often. In addition to the previously mentioned public benefits, participants also saved money, reduced their stress levels, increased their physical exercise, felt more connected to their community, shopped more at nearby neighborhood businesses, and enjoyed more quality time with family members.

Most households saved an average of \$70 per week getting around using non-drive-alone modes of transportation compared to the cost of owning and operating their "extra" car (that's over \$3,600 in a year). As a result of all three rounds of the Study, eighteen out of ninety households<sup>1</sup>, or 20%, sold their "extra" car. They realized the economic savings that were possible along with the viability of getting where they needed to go using other modes. And two of those households went on to sell not just one but *two* of their "extra" cars!<sup>2</sup> The majority of participants understood, for the first time, just how much their car was costing them per week and per year. They were truly surprised by how much they were spending. All of the households said they will continue making more thoughtful choices about how they travel, and won't be so likely to hop into the car without thinking about whether there is another way to get where they need to go, especially seeing the numerous personal benefits of reduced car use to their quality of life.

### **Details of Results**



**Figure 1\*: Total Participant Miles Traveled Per Week by SOV, Baseline vs. Test Period, Fall 2002 Round<sup>3</sup>**

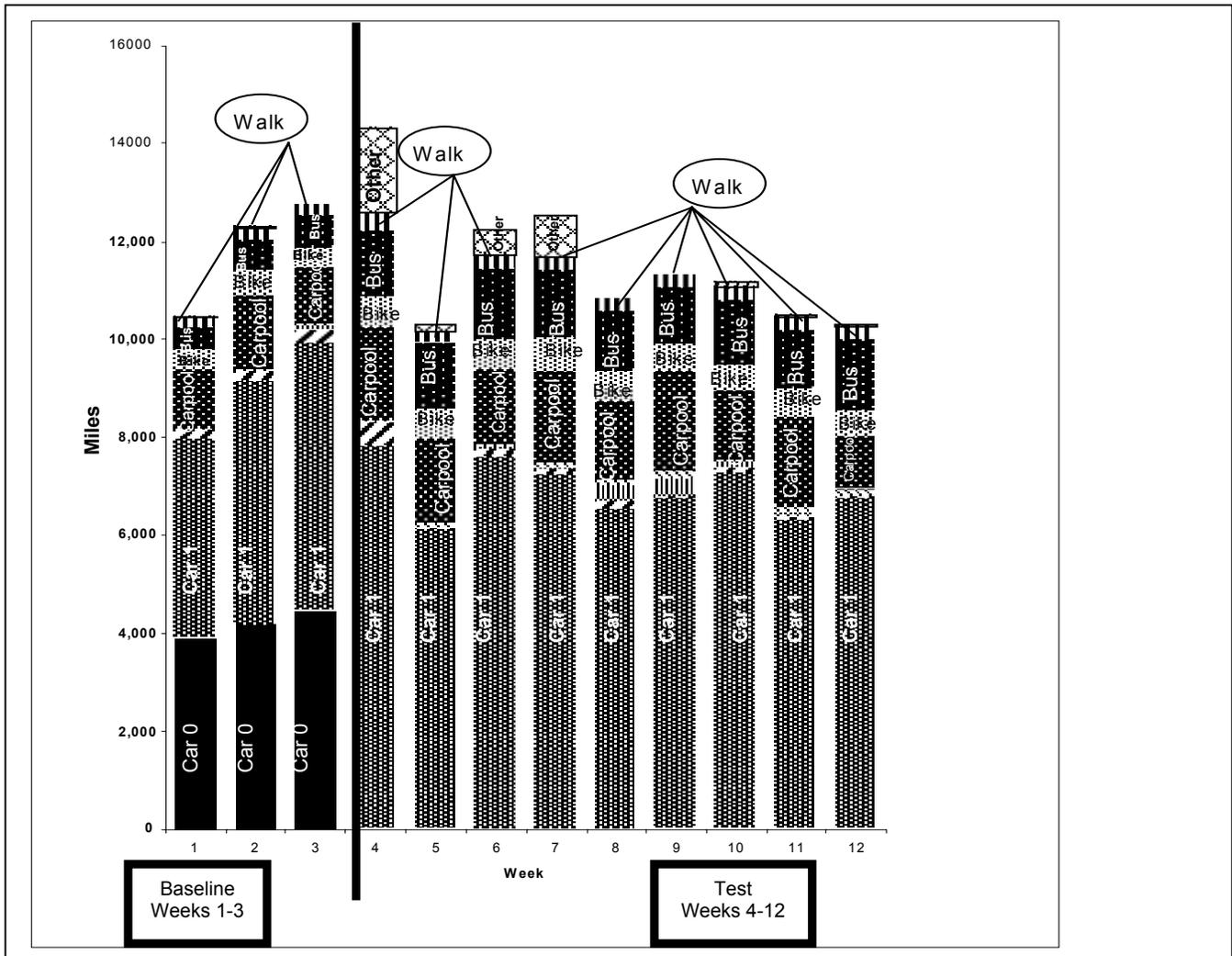
As Figure 1 shows, total SOV use decreased significantly - by 22% - in the Test period compared to the Baseline period, primarily due to the removal of Car 0 (the car they parked). Figure 1 shows that Car 1 use increased dramatically in the Test period, partially compensating for the lack of Car 0. However, the increased use of Car 1 and other SOV modes in the Test period is still significantly less than all SOV modes – including Car 0 – in the Baseline, indicating a real reduction in SOV and car miles took place. It is also clear from Figure 1 that the usage of Cars 0 and 1 dwarfed that of the other modes of single-occupancy vehicle transportation (such as borrowed cars, Flexcar, rental cars, and taxis).

<sup>1</sup> Eighty-six households took part in the study proper. There were four more households which decided to sell their second car before the study began based solely on realizing how much they would save by not owning it, which they discovered by filling out our Car Cost Worksheet during the study intake process.

<sup>2</sup> To be eligible, applicants could not have more cars than drivers (so that a 2-driver household would go from 2 cars to 1 car during the study, and so on). This is because giving up a car in a household with more cars than drivers is not that hard.

<sup>3</sup> The third round in Fall 2002 had a total duration of 12 weeks: 3 Baseline weeks followed by 9 Test weeks.

\*This chart is identical to Chart 13 in the 2002 "Report on Results" document.



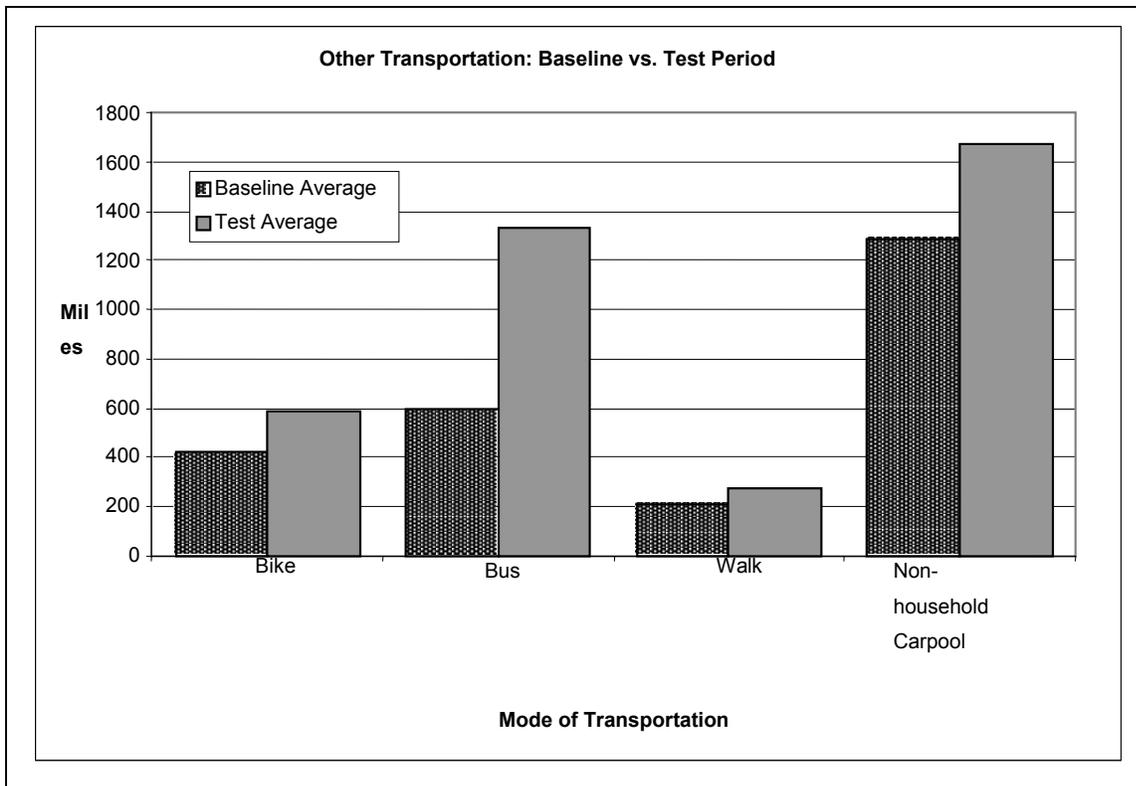
**Figure 2\*: Miles Traveled by All Modes - 2002 Round**

As Figure 2 shows, participants are able to get where they needed to go much the same even when living with "one less car." Although the car they parked (Car 0<sup>4</sup>) is no longer used after week 3, total miles traveled by all modes do not decrease - in fact, the first week of the Test period (week 4) was the most heavily traveled week of the study.

Total miles driven by all single occupant vehicles (SOV) - such as Car 0 (the car they parked), Car 1 (their primary car), Other SOV (borrowed cars, Flexcars, rental cars, and taxis) - do decrease in the Test period compared to the Baseline. Figure 1 shows that although the participants shifted much of their Car 0 travel to Car 1, they still had an overall **decrease** in car trips and trips by all SOV modes. At the same time biking, busing, carpooling, and walking clearly **increased** in the Test period.

<sup>4</sup> We chose to label the car they were "giving up" for the study as "Car 0", because it "disappeared" during the Test period of the study.

\* This chart is identical to Chart 1 in the 2002 "Report on Results" document.



**Figure 3\*: Non-SOV Usage, Baseline vs. Test Period, Fall 2002 Round**

In Figure 3, usage of all non-SOV modes of transportation **increased** in the Test period, as participants shifted their travel choices to non-SOV modes after Car 0 was removed. Overall bicycling mileage increased by 38%, transit use (bus) mileage increased by 125%, carpooling mileage increased by 23%, and walking mileage increased by 30%!

#### **Results For Families with School Age Children**

We analyzed the results for participant families with school-age children in the Spring 2001 round<sup>5</sup> in an effort to identify unique changes in transportation habits for this group. The Spring 2001 round was the only one giving us a comparison between travel behavior during and after the school year. It ran from mid-May to the end of July including the end of the school year in mid-June. We were interested in how the end of the school year may have affected trips and miles traveled for those participants with school-age children.

Results reveal curious trends. The number of miles traveled dropped over 100 miles per week from the baseline period to the first three weeks of the Test period (up to the end of school), but the number of trips stayed much the same. Once the school year ended (weeks four to six of the Test period), the number of trips for these households with school-age children dropped nearly 20%, while the number of miles traveled fell even more, this time to an average of roughly 27% less than during the baseline period.

This suggests that these families traveled fewer miles while making the same number of trips while their children were in school, possibly choosing **different** or **closer**, destinations. Or perhaps they made **quicker** or **shorter** trips because more drivers were sharing the same car.

<sup>5</sup> The second round in Spring 2001 had a total duration of 9 weeks: 3 Baseline weeks followed by 6 Test weeks.

\* This chart is identical to Chart 20 in the 2002 "Report on Results" document.

### **Summary of Combined Results from All Rounds**

Simply said, while participants did reduce auto trips and mileage, they still had the mobility they desired and got around using non-SOV modes instead. Combining the results of all three rounds of the Study together, the eighty-six participant households reduced a total of:

- 41,463 miles driven<sup>6</sup> - which is almost enough to drive around the earth twice, or
- an average of 1,974 miles not driven per week, or
- 482 miles saved per household<sup>7</sup>.

Likewise, participants made a total of:

- 8,003 fewer car trips<sup>8</sup>, or
- an average of 381 fewer car trips per week, or
- 93 fewer trips per household.

Finally, the eighty-six households reduced total CO<sub>2</sub> emissions by:

- 30,198 pounds<sup>9</sup> - comparable to 15 six-lane swimming pools of pollution, or
- an average of 1,438 pounds per week, or
- 351 pounds per household.

A majority of participant households were able to reduce SOV (drive-alone) trip mileage by using other modes (biking, busing, carpooling, and walking) or by consolidating and linking trips. When compared against their baseline travel behavior in the test period<sup>10</sup>, there was:

- a 27% **decrease** in overall SOV (drive-alone) vehicle miles, and
- a 30% **decrease** in overall number of SOV (drive-alone) trips per week.

At the same time there was:

- a 30% **increase** in overall miles traveled using non-drive-alone modes, and
- a 53% **increase** in overall number of trips made using non-drive-alone modes per week.

For example, in the 2002 round Test period:

- bicycling mileage increased by 38%,
- transit use (bus) mileage increased by 125%,
- carpooling mileage increased by 23%,
- and walking mileage by 30%!

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<sup>6</sup> The Test period in the first and second rounds of the Study was 6 weeks long, and was 9 weeks long in the third round. In the first round, 22 households saved 8,100 miles in the just 6 weeks. In the second round, 23 households saved 7,600 miles in just 6 weeks. In the third round, 41 households saved 25,763 miles in only 9 weeks. This totals 41,443 miles.

<sup>7</sup> Figure is the average total miles saved per household.

<sup>8</sup> In the first round, 22 households saved 1,700 trips in the just 6 weeks. In the second round, 23 households saved 1,200 trips in just 6 weeks. In the third round, 41 households saved 5,103 trips in only 9 weeks.

<sup>9</sup> In the first round, 22 households saved 6,500 lbs. of CO<sub>2</sub> in the just 6 weeks. In the second round, 23 households saved 6,100 lbs. of CO<sub>2</sub> in just 6 weeks. In the third round, 41 households saved 17,598 lbs. of CO<sub>2</sub> in only 9 weeks.

<sup>10</sup> These percentages are derived from the combined results for the 2001 and 2002 rounds - we did not fund this level of analysis for the first round in 2000.

### What's Next?

The "**One-Less-Car**" **Demonstration Study** forms the basis of a public education campaign urging citizens to make wise transportation choices – including selling their second cars. A small pilot version of this "transportation conservation" campaign was launched in Fall 2003 as the "**One Less Car Challenge**." Participants will learn that making more thoughtful transportation choices - and in some cases that owning fewer cars - reduces stress and saves money. The campaign promotes drive-alone trip reduction through increased use of biking, busing, car-sharing (such as the Flexcar club), and walking by educating about all available travel modes and providing incentives to drive less.

Recycling . . . waste reduction . . . energy conservation . . . water conservation . . . Seattle led the way serving as a model for other cities around the country. Could reducing city traffic and air pollution be next?

Details and products may be found on the project web site at [www.seattle.gov/waytogo](http://www.seattle.gov/waytogo) or by contacting [waytogo@seattle.gov](mailto:waytogo@seattle.gov) or (206) 615-1550.



## RATIONALE AND PUBLIC BENEFIT

### Goals and Hypotheses

The goals for the *Way to Go, Seattle!* Demonstration Study are:

1. **Reduced VMT and emissions:** Reducing Vehicle Miles Traveled (VMT) and carbon dioxide (CO<sub>2</sub>) emissions, and quantifying the number of VMT and pounds of CO<sub>2</sub> emissions reduced during the project.
2. **Education:** Raising public awareness of the cost of driving<sup>1</sup>, and encouraging Seattleites to think about their auto trips and car usage.
3. **Multi-modal Network:** Promoting a seamless transportation network that includes buses, regional rail, car and van pooling options, ferries, car-sharing programs, taxis, telecommuting, bike lanes and facilities, pedestrian improvements, and automobiles.
4. **Cost Savings from Auto Independence:** Increasing recognition of an idea already built into the City's co-sponsored Location Efficient Mortgage program ([www.seattle.gov/housing/LEM](http://www.seattle.gov/housing/LEM)) – that living close in and close to work can mean less transportation cost (no second – or even first - car needed). Therefore in-city living is not as expensive as housing prices alone would indicate.

The hypotheses for the *Way to Go, Seattle!* Demonstration Study are:

1. **Mobility:** Households will discover they can have the mobility they desire while owning and operating fewer cars if they make use of all the transportation options available to them. If households plan their trips better and re-evaluate how they think about their transportation choices, they can achieve the same level of mobility with fewer cars.
2. **Price Change:** Households will shift from a fixed cost transportation situation (with about 80% of the cost of automotive usage being fixed) to a pay-as-you-drive model that includes transportation alternatives, car-sharing, and taxis. When people have a car readily available, they tend to think that using it is free, since the up-front costs are already paid and each trip incurs few additional costs. As the study raises the awareness of participants about the actual costs of car ownership, they will more realistically evaluate the financial costs of the various modes of transportation available, and will use other modes to realize financial savings. Households will find the cost comparison between car ownership and other modes so compelling that they will opt to sell their second car.
3. **Reduced VMT and emissions:** A reduction in VMT and CO<sub>2</sub> emissions will result through reduced car ownership as well as through changed behavior in transportation choices. Households that operate fewer cars will rationally eliminate some car trips, either by choosing another mode or by eliminating some trips altogether. Regardless of whether they reduce their car ownership, households participating in the study will demonstrate changes

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<sup>1</sup> Patrick Hare & Associates go on to note that "Transit and occasional car rental cost about \$1,300 a year. Middle and lower income Americans can save more than \$3,000 a year, net, by giving up a second car for transit and occasional car rental. For many households, that will mean a 10 percent increase in disposable income. If taking transit adds thirty minutes each way to a commute, or an hour a day for 250 days a year, and saves \$3,000 a year, you can pay yourself \$12 an hour to give up a second car and sit on transit" (1996, Maryland) .

in transportation choices due to the information and experience of using non-SOV mode choices gained during the study.

4. **Reduced Parking Requirements.** If the study proves successful, reduced car ownership lowers parking demand in residential buildings which in turn supports reducing multi-family housing parking requirements.

## Use of Public Funds

Similar to energy and water conservation campaigns that have been adopted in many cities, the **Way to Go, Seattle!** Demonstration Study has helped develop a new conservation model for transportation. Our larger goal is to raise awareness of city residents to think about good air quality and mobility the same way they think about electricity and water – as a resource that should be conserved by small behavior changes that can make a big impact if made collectively. We already know a lot about the incentives and disincentives to reducing trips through Commute Trip Reduction (CTR). The additional information we have received from participants' travel diaries has helped us to understand how best to formulate a public education program that appeals to Seattleites for all trips beyond commute trips, and which helps them think about reducing their dependence on their cars.

The public benefit includes less neighborhood traffic and congestion, reduced safety and injury risks, decreased costs of street maintenance, and better air quality through emissions reduction, as well as increased physical exercise and amount of quality time spent with family members. The majority (over 60%) of greenhouse gas emissions are from driving, and over 75% of all trips are not work related. In essence, the City is “buying” the trip reduction of the participating households for the public benefit, which allows us to provide the study stipend as an economic incentive offered in the study (and it would need to be treated as reportable income).

Specifically, the public benefits include:

- Emissions reduction – the majority (over 60%) of greenhouse gas emissions are from driving. We have quantified the emissions reduced during the three rounds of our study.
- Reduction in wear and tear on the roads.
- Decreasing traffic congestion. Traffic congestion rates very high on people's concerns. Over 75% of all trips are not work trips. A major reason for driving is that people have not internalized their high auto costs when making transportation decisions.

We worked with our legal staff to prepare a contract that protects public agencies and defines the public benefit from this project similar to an energy conservation program. The contract requirements stipulate that participating households:

- agree not to drive their car at all for a period of six weeks
- would forfeit some of their stipend if they drove the off-limits car
- would keep a daily travel diary of all their trips, including two weeks of baseline data where they tracked their normal behavior with all cars at their disposal
- would receive a study stipend each week, contingent on turning in a completed travel diary for each week that they did not drive their car
- would be willing to be interviewed and their stories used for promotion of the Way to Go program for one calendar year from the ending date of their round of the study

The first two rounds of the study were funded by City of Seattle transportation funding, and the third round was funded by a Federal Highway Administration (FHWA) Value Pricing grant to evaluate additional pricing components, and to produce a replicability package. The City funds used on this study complements investments the City has made in pedestrian, bicycle, transit, and street facilities, and thus is a cost effective part of the mix of efforts to improve Seattle's transportation system.

## **Scope**

The funding available for the study was the determining factor that limited the number of participants. We chose to use the first study as a focus group, rather than doing extensive focus groups beforehand. The City has already learned a lot about the incentives and disincentives to reducing trips through its Commute Trip Reduction (CTR) programs, and the additional information gathered from participants' travel diaries has helped us understand the intrinsic benefits of reduced auto use for all trips, which can then be the basis of an educational program.

We knew when we started this project that the three rounds of the study are not large enough to produce statistically significant research data in a stringent scientific sense. The eighty-six participating households are too small a sample to produce statistically significant results given the variables of family types, neighborhood accessibility options in Seattle, and seasonal changes and potential weather impact during the project. Even with the small sample size of the study, they have created useful insights into circumstances that create both barriers and successes to transportation behavior changes, quantifiable data of environmental effects of trip reducing choices, and anecdotal stories ideal for a public education effort.

Seattle residents are generally concerned about environmental issues, so when the study was introduced, we received comments from residents who were already living with only one car, or who had gone completely car-free. We responded by thanking those people who are leading the way for others by demonstrating that it is possible to live with one car or no cars, and by pointing out that they are already receiving the economic, environmental, and quality of life benefits of their choices. We informed people the study was not designed to provide an incentive for every household in Seattle, nor is it intended to be a long-term program. Rather, it is a way to gather information that will form the basis of an educational effort to get Seattleites to think about their transportation choices.

Some questions also arose regarding the value of the program to households who cannot afford multiple cars. The costs of owning and driving a car is particularly important for low-income households where the cost of car ownership can require a disproportionate portion of their income - some spend more on car-related transportation costs per month than on groceries. The program materials that have been developed to date help all drivers calculate a more complete financial assessment of car ownership costs, as well as assist in making non-car transportation methods more meaningful. Additionally, the City of Seattle is investing in a variety of transportation choices, such as improved access to buses, car-sharing, van pools, and bike and pedestrian paths, so that every Seattle resident, whether they own a car or not, can get around our city with greater ease and reliability.



## RUNNING THE STUDY

### Starting the Study

The first round was announced in Fall 2000 through various media such as the Seattle Times, Seattle P-I, KIRO Radio, and KING-TV. We received over 200 applications, with about ninety of them qualifying for the target of twenty-five spots. The 2001 round had less media attention and over ninety applications to fill the target of twenty-five spots. The 2002 round had around 120 applicants to fill the forty target spots, and additional outreach efforts were made to recruit in communities of color and communities where English is a second language. The following criteria was used to select finalists:

- Is the applicant a resident of Seattle? (Residents of other Puget Sound cities were not eligible.)
- Is the ratio of cars to drivers in the household 1:1 or less? (Households with more cars than drivers were not eligible.)
- Does the applicant have a well thought-out plan for adapting to life with one less car for both work commute and overall mobility needs?
- What is the LEM (Location Efficient Mortgage) score of the neighborhood the applicant lives in? (We used the City's LEM program to help quantify our applicants' ease of participation<sup>2</sup>, though we also made decisions based on geographic diversity and housing types.)
- What type of household did the applicant live in? (We strove for a group of participants from a mix of different housing types and family configuration such as including some households with children and some without.)
- Additionally, finalists were asked to fill out a Car-Cost Worksheet and Pre-Program Questionnaire to broaden our knowledge of each household's situation beyond the information provided on the initial application.

Twenty-two households for the 2000 round, twenty-three for the 200 round, and forty-one households for the 2002 round were selected as the final participant groups. For the most part all were two-car households who were going down to one car during the Non-Driving period of their round of the study. However, in the Spring 2001 round, two households gave up their only car, one of whom was a single mother with two school-age children, and in the Fall 2002 round seven households gave up their only car. Only in the Spring 2001 round was there a three-car household (who had three drivers), and which went down to two cars during the study.

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<sup>2</sup> Location Efficient Mortgages (LEM<sup>CM</sup>) are one way of recognizing the advantages of the variety of transportation options available in a city - including walking to the corner store, biking to the park, and taking the bus to work. An LEM<sup>CM</sup> rating takes into account the attributes of the neighborhood where a home is located and the unique characteristics of the borrower's household. A Location Efficient Value, or LEV, is then computed that can be used by the lender as part of the customary evaluation process. The net result is that borrowers are likely to be able to qualify for a mortgage that is several thousand dollars larger than the traditional mortgage due to consideration that transportation costs may be less. According to the 1990 Census, the citywide auto ownership per household is 1.49 cars per household. In general, the downtown and urban village neighborhoods had lower ownership rates than outlying areas, which reflects among many characteristics the higher density of population and accompanying ability to locate services and necessities closer to users, and better transit service. In general, studies have found that as density and transit service improve, auto ownership drops.

In all cases we selected slightly more than our target number of households, and had to engage in unexpected last minute recruiting efforts to replace some finalists who dropped out. The reasons for a household dropping out were various - some participants were no longer able or interested in committing to the study, some participants simply never returned calls to confirm their participation or did not show up at the orientation, some participants got a new job which required the use of their extra car or which necessitated relocation out of the area, or some participants sold their extra car as the study was starting, and were no longer eligible or able to go without their only remaining car. In a number of cases this was in spite of us receiving ongoing communications from them during the recruitment and selection process which affirmed their interest and availability to participate.

In the Fall 2000 round, a number of participants were only able to complete two rather than three of Baseline weeks because they were recruited as last minute replacements during the first week of the study. Likewise in the Fall 2002 round, several households started on the second week of the Baseline period because they were recruited at the last minute as replacements for households which dropped out during the first week. And in the Fall 2002 round we added a couple households during the first and second week of the baseline to replace those that dropped out unexpectedly.

The final twenty-two, twenty-three, and forty-one households attended an orientation and kickoff meeting where they reviewed and signed a contract for participation stating that:

- They agreed not to drive one of their cars at all for a period of six 'non-driving' weeks (or for nine 'non-driving' weeks during the 2002 round);
- They would keep a daily travel diary of all their trips, including three weeks of Baseline data where they tracked their normal behavior when using all their cars, and six (or nine) weeks of Non-Driving data where they did not use their extra car;
- They would receive a stipend of \$85 per Non-Driving week (for the 2000 and 2001 rounds, or an amount approximately equal to their weekly car cost for the 2002 round) as compensation for the extensive data collection they were providing, and also to simulate savings they would realize if they actually no longer owned their extra, and \$25 per Baseline week as compensation for performing study tasks such as filling out the diaries;
- They would forfeit some of their stipend if they drove the extra car during the Non-Driving weeks<sup>3</sup>; and
- They would be willing to be interviewed, and their stories used for promotion of **Way to Go, Seattle!** and the Demonstration Study for one year from the end of the round.

At the orientation, the participants were also asked to bring with them the car they would be giving up, and the odometer reading, Vehicle Identification Number (VIN), license number, and make, model, and color were recorded. Participants were given information packets about the range of alternative transportation modes available to them in the City and around Puget Sound,

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<sup>3</sup> If a participant household drove the extra car once, the weekly stipend would be reduced to \$60 for the week the car was driven as an adjustment for the 'trips' the City was buying back. If the car was driven a second time, the payment would be reduced to \$35 for that week. The third instance of driving the car would result in termination of the household's participation in the program. For the 2002 round the first violation resulted in a 50% reduction of the stipend amount, the second violation resulted in a 100% reduction, and the third violation would result in termination. In all rounds of the study, there was only one instance of an extra car being driven during the Non-Driving period.

and familiarized with filling out and turning in the travel diaries. Deposit slips or voided checks were obtained from each household for the City to deposit their stipend electronically where possible, and by postal mail where necessary.

## Weekly Activities

The weekly travel diaries were designed to record each trip from point to point (so that a trip to the store and back was two trips), mode of travel used, distance, cost (if any), whether the person keeping the diary was a driver or passenger, and anecdotal comments. The participants either mailed in or electronically submitted their travel diaries weekly each Monday. The diaries were checked for completeness and accuracy, and the data was entered into a spreadsheet.

To help keep them engaged in the program, all participants were e-mailed or phoned each week. Some messages included directions on how better to fill out their travel diaries or other operational details. Other messages included the results thus far as well as a selection of quotes from the recent travel diaries. This would normally include the number of trips reduced, miles reduced, and pounds of carbon dioxide not emitted into the atmosphere as a result of their efforts. We also alerted the participants any time there was fresh media coverage of the project.

In addition to recording the extra car's odometer readings at the orientation session, City staff verified odometer readings by on-site inspections at participants' homes during the beginning and ending of the Non-Driving periods to ensure the extra car had not been used. A reasonable allowance (such as less than one mile) was made for households who parked their car on streets that had a seventy-two hour on-street parking limit. An odometer tracking sheet was also developed that allowed participants to keep track of odometer readings themselves at various points during each round (see *On Odometer Readings* on page 39 in the **Lessons Learned** section).

## Ending the Study

Following the ending week of each round of the study, households completed an Ending Evaluation that allowed them to reflect on and summarize various dimensions of their experience. In a month or two after the end of the round, participant households attended a celebratory wrap-up and debriefing where they met with each other and project staff to discuss and add to their accounts, and review their case studies that staff had assembled for dissemination to the media and interested parties (see appendix). In the wrap-up for the first round, the current Mayor and two City Council members were also in attendance to meet the participating households, recognize their efforts, and hear suggestions on transportation improvements that would make getting around easier. For the third round, the current Director of the Seattle Department of Transportation attended the wrap-up celebration and debriefing, and emphasized the value of the work the participants had done. The media were also invited to make use of the wrap-up meeting opportunity to interview the participants. The date of the wrap-up was January 8<sup>th</sup>, 2001 for the 2000 round, September 22<sup>nd</sup>, 2001 for the 2001 round, and January 25<sup>th</sup>, 2003 for the 2002 round.

In the second and third rounds, participants were offered incentives if they sold (or otherwise got rid of) their extra car within six weeks of round's ending date, and agreed not to replace that vehicle for at least one year. The incentives offered were a Metro pass good for one year, and a year membership in Flexcar (a national car-sharing club with many vehicles located in Seattle) at the basic use level (use over the basic level would be paid by the household). The offer of incentives was to build on the momentum of the behavior changes participants had engaged in during the study in order to, hopefully, help them take the next step of eliminating their use of an extra car completely. Also in the second and third rounds, a Follow-Up Survey was conducted approximately six months after the end of the study to determine lasting behavior changes.



## DATA COLLECTION DESIGN

### Cost of Car Ownership Calculation

Accurately understanding the cost of various modes of transportation, and being able to make smart choices based in part on those expenses, is intrinsic to the premise of the **Way to Go, Seattle!** Demonstration Study. The current way of pricing car ownership and related costs such as insurance, as well as the perception that parking on the street in front of one's home or driving on the highway is "free," contribute to the practice of using one's car as much as possible. There is a tendency to act as if expenses – such as a one-time purchase to buy a car and regularly scheduled insurance payments based on increments of time rather than miles driven – are not strongly tied to the amount of usage except for fuel costs.

After the first round in 2000, participants were asked to estimate the money they would have saved if they did not own the extra car compared to the money they had spent on alternative modes of transportation during the non-driving period. Many of the participants made low estimates due to failure to include all costs of car ownership. To fix this, the project developed a *Car Cost Worksheet* for use in subsequent rounds (see appendix for sample). The Worksheet provides a way that is consistent to all participants in calculating complete costs of car ownership. The Worksheet generates a monthly figure for car ownership expenses that accounts for car payments, registration fees, insurance costs, maintenance, parking, and gasoline. We found that the average cost of car ownership for participants in the 2001 round was around \$65 per week, which is less than the national average of \$85 per week, and in the 2002 round was around \$82 per week, just under the national average of \$85 per week.

In the second round (2001), households were asked to complete the Worksheet prior to the start of the program. Surprisingly, upon completing the Worksheet, four finalists decided to sell their extra car immediately, thus opting out of participating in the study, based on how much they would be saving. While this meant we had to recruit a few more households at the last minute, we were impressed with how well the Worksheet made evident ordinarily invisible car ownership costs. This helps confirm that our long-term goal to use the results of the studies in a public education campaign has merit. The Car Cost Worksheet is currently available to the general public via the program's website at [www.seattle.gov/waytogo](http://www.seattle.gov/waytogo).

## Baseline and Non-Driving Periods

The Demonstration Study used a Baseline period of either two or three weeks to establish a record of participating households' typical transportation choices and car usage, and a Non-Driving period of either six or nine weeks to record how behavior changed once the extra car was parked<sup>4</sup>. Comparing a household's trip choices between these two periods helped identify what behavioral changes occurred. For instance, did a household merely drive their remaining car twice as much to compensate for the absence of the extra car? Or did the household make new choices in their modes of transportation to achieve the same trips as before? Or were some trips eliminated, or new ones added, or were some combined? And so on.

The timing of the first round in Fall of 2000 ran from October 19<sup>th</sup> to December 10<sup>th</sup>, and we had concerns that running the study into the early holiday season might cause atypical car usage patterns in the data collection. To address this concern, all households participated during the same eight or nine week period for the study. However, to offset the possibility of atypical holiday-related trip generation, some households had their Baseline period before their Non-Driving period, and some did their Non-Driving period before their Baseline.

The idea of varying the sequence of Baseline and Non-Driving periods helped mitigate the issues of holiday-related change in the travel data recorded by enabling comparison of Baseline and Non-Driving records against each from the same and alternate time periods. But the variance in sequence did have a downside in that we noticed the households who did their Baseline period after their Non-Driving had behavior changes signaling that trip reduction habits learned in the Non-Driving period had carried over to the Baseline, therefore skewing the Baseline data for those households. Additionally, during Thanksgiving week 2000, it was difficult to tell whether some trip behavior was normal or not, so we ended up discarding that week of data from some participants' statistics.

In addition to the holiday season, there are other challenges to getting truly representative data. The second round in Spring of 2001 ran a three week Baseline period first – from May 14<sup>th</sup> to June 3<sup>rd</sup> – and a six week Non-Driving period second – from June 4<sup>th</sup> to July 15<sup>th</sup>, during which time both Public School and University classes ended. In some cases, households that had school-age children or who taught or worked for an institution of higher education showed significant changes in trips made after the third week of June compared to before that date.

We deliberately timed the 2001 round so that the three week baseline period did not fall across the ending week of school, and so that the six week Non-Driving period was cleanly broken across the ending week of school into a couple of three week segments which provided an ease for comparison with the three week Baseline period. Structuring the data collection periods in this way to take place partially while school was both in and out of session allowed us to look for school-related impacts on trip behavior (see *On Children and School Year Influences* on page 42 of the **Lessons Learned** section).

For the 2002 round we timed the Baseline period to start just after Labor Day – from September 3<sup>rd</sup> to 22<sup>nd</sup>, and the Non-Driving period to start on September 23<sup>rd</sup> and end at the Thanksgiving weekend on November 24<sup>th</sup>. Due to the longer time period for this round (a total of twelve weeks rather than nine) it was challenging to find a window of time in the year which provided

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<sup>4</sup> In the first round in 2000, participants had either two or three weeks of the Baseline period, and six weeks of the Non-Driving period. In the 2001 round, they had three weeks of the Baseline period, and six weeks of the Non-Driving. In the third and final round in 2002, participants had three weeks of the Baseline period, and nine weeks of the Non-Driving period.

the least amount of opportunities for atypical trip behavior, such as that which occurs around holidays, Spring Break, and other vacation times in the calendar cycle

## Travel Diary

Every licensed driver in each household was required to keep a diary of the trips they made each day. The diary format used was based on the diary our local Metropolitan Planning Organization (MPO) uses for its survey on local trip generation. Initial changes were made to collect more detailed data over a longer period of time, and it was further modified for the Spring 2001 study to better determine which trips are reduced, and to increase participants' ease of use (see the appendix). Data captured includes:

- the destination of the trip (Activity column);
- the mode of transportation used (How column);
- whether the participant was the driver or a passenger (Driver or Rider column);
- distance of the trip (Distance column);
- costs associated with the trip (parking fees, bus or taxi fare, etc.) – not including gas, repairs, or maintenance which are captured in the Car Cost Worksheet (Cost column);
- any comments about the trip, especially concerning how the trip fits into their transportation choices (Comments column);
- and, for the Non-Driving diaries in the 2001 and 2002 rounds, whether or not the trip is one the participant would have normally made by car (Y or N in Comments column).

A trip was defined as going from point “A” to point “B”, so a trip to the store and back would be recorded as two trips; one from home to the store, and a second trip from the store to home. Setting the data collection format in this way helped us to identify linked trips, and helped us spot when trips were “saved”. Participants began a new diary sheet for each day, and each day is assumed to begin from home unless otherwise noted. Participants did not keep the diaries when they went out of town on vacation, other than to record the trip to the airport from home, and their return trip from the airport to home, for example<sup>5</sup>.

In the 2001 study, we experienced some confusion in how participants used the term “carpool” in their diary entries. The instructional material we provided clearly defined that use of the term “carpool” (and “vanpool”) in the diaries should refer to an organized carpool with others outside a participant’s household, such as would typically take place for work or youth activities. However, some participants used the term to refer to any instance when two or more people rode in one car together, often both from within the participant’s household. It took a couple of weeks into the 2001 round to spot this trend in the use of the word “carpool,” and contact the participants in question to clarify their usage. However, this situation somewhat affected the data and analysis for the 2001 round by making it appear that some households used carpools more during the Baseline period than during the Non-Driving – a counterintuitive result at the least – because of the imprecise use of the term earlier in the study, and the corrected use later in the study. The clear use of the term “carpool” was also important because many households commented at the end of their study that carpooling was a key benefit due to the enjoyment of going places together with friends.

For the 2002 round we modified the travel diary format to prevent imprecise use of the term “carpool” by providing separate columns for mode selection: “Household Carpool” referred to trips made where the participant was a rider in a car driven by another family or household member, and “Non-Household Carpool” referred to trips made where the participant was a rider

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<sup>5</sup> Diary record keeping methods in the 2000 round was not always effective in tracking which trips were atypical, and so the ability to screen out unusual trips, such as a day trip to nearby Mt. Rainier, was imprecise. Changes to diary recordkeeping methods were made for the 2001 and 2002 rounds which greatly improved this situation – see near the bottom of page 23.

in a car driven by a non-family or non-household member. This modification eliminated the confusion and imprecise use of the term “carpool”.

To clarify, for each trip where a participant is the driver of a car, they indicate which car they are driving (either their own Car 0 or Car 1, or a Flexcar, rental car, or borrowed car). For each trip for which a participant is the rider in a car, they indicate only whether they are riding in a car with a household member as a driver (a Household Carpool) or in a car with a non-household member as a driver (a Non-Household Carpool). Where two people in the same household take a trip together, where participant A is the driver, and participant B is the rider, and then on the return trip they switch where participant B is now the driver and participant A is now the rider, we can fairly easily determine this by comparing their diary entries on that day. By using this categorization system, we can isolate changes (increases or decreases) in how much a participant is carpooling, and whether, or how much of, the changes are through catching rides with other family or household members versus making arrangements with friends or co-workers.

In the 2002 round we introduced new formats for the travel diaries. Previously the participants could use a paper journal format for their diaries and either fax or postal mail them to us each week, and in the 2001 round participants could also fill out an electronic word document version of the diary, and e-mail it in each week. For the 2002 round we developed both an Excel spreadsheet version of the diary as well as an online Web Diary interface utilizing the SQL Server database capabilities of the City’s Department of Information and Technology.

Participants who used the spreadsheet version of the diary could e-mail them in each week, and then we combined each driver’s spreadsheets for multiple weeks to easily calculate various totals for the Baseline and Non-Driving periods. Participants who used the online Web Diary would go to a web address we provided, login to a unique user account we created for each driver, and then enter trip data through a form on a webpage. When done entering each trip’s data, they click on a button to ‘add’ the trip to their diary. The data would then be transmitted electronically into a SQL Server database housed in the City’s servers, and project staff could then download from the SQL Server each week’s data into an Excel spreadsheet on their workstation desktop, and sort trips into chronological order by each driver’s unique ID. Both the Excel spreadsheet diary and the online Web Diary achieved considerable savings in staff labor due to reduced time spent on data entry from paper diaries or electronic word document diaries into a spreadsheet application.

For the 2001 and 2002 rounds we also developed a clear definition of what trips were not to be recorded. We wanted to screen out what were atypical trips so the mileage of these trips would not skew the data. The final definition we used in the 2002 round was any trip that was either more than one day’s drive away or outside the general geographic area of the Puget Sound region - basically anything that was more than just a day trip away. The reason for doing this is that trip behavior on vacations, or extended getaways, does not reflect an average week for most households. Since we used just three weeks of usual driving behavior as a baseline, it is important to remove data outliers that would create anomalous travel diary records in Non-Driving weeks.

If a household makes a two-day drive to an ocean shore vacation, and then leaves the car parked for most of the rest of the week, this will not help us understand that household’s regular travel behavior, nor does it help us understand the changes in a household’s trip behavior when they have one-less-car to use. So we screen out the atypical trips and direct household not to

bother keeping a travel diary when they are on vacation, especially if they have flown to a far away destination.

We screened out applicants who had plans to be gone for more than a week during the study period. To make up the missing days of travel data in the Travel Diaries of households who were gone out-of-town during the study, at the end of the study we calculated an average per week mileage amount based on the mileage for the days that were recorded. We then used this "synthesized" per week average and inserted in proportionally into the weeks where a vacation was taken.

## Trips Saved

Among the information we wanted to have clearer insight into was if the number, frequency, and nature of trips made by participants changed in any way between the Baseline and Non-Driving periods (between when they made trips as usual, and when they had one less car available to use). It would be useful to know, for example, if participants merely doubled the number of trips made with their remaining car during Non-Driving period, or if they changed how they made some trips, or if they stopped making some trips entirely in this period.

We compared the average number of trips and miles made by SOV modes between the Baseline and Non-Driving periods as a way to quantify the reduction in driving, and this is described further in the next section (see **Comparison Method vs. Saved Trip Method** on page 28). Counting up the saved trips and their total mileage allowed us to quantify the reduction in greenhouse gas emissions and the miles of neighborhood traffic that were reduced. Saved trips also reduce the “cold start” pollution.

We define a “saved trip” as one made by walking, bicycling, carpooling, busing, or taxi that the participant would normally have made as the driver of a car, therefore all saved trips are trips saved by using non-car modes of travel in place of car-dependent modes of travel. Flexcar, rental car, and borrowed car trips are not counted as saved trips because they are trips that still involve being the driver of an automobile. Taxi trips are counted as saved because taxis are already out driving the streets of the city and the trips do not involve adding another car to the roads of Seattle. Counting up the saved trips and their total mileage allowed us to quantify the reduction in greenhouse gas emissions and the miles of neighborhood traffic that were reduced. Saved trips also reduce the “cold start” pollution.

For the 2001 round we added a question to the Non-Driving period diaries asking participants to indicate for each trip whether or not it was one they would normally have made using a car. By comparing trips and destinations between the Baseline and Non-Driving periods of a household, and using participant’s response on the diaries as to whether or not they would have normally made a trip by car or not, we are able to see what kinds of SOV trips participants stopped making, and what kind of non-SOV mode trips increased.

We made a determination for counting a trip as a saved trip based on the observed habits of each participant evidenced in their diaries, and from comments they provided regarding if they previously would have driven. For instance, if a participant normally drove home after work, and then from home to the grocery and back during the Baseline period, and then during the Non-Driving period they made trips from work to the grocery store, and then to home, that would be considered as saving a trip because the participant is consolidating their trips (from work to home, then from home to the grocery store and back adds up to three trips, whereas from work to the grocery store and then to home adds up to two trips). We also compared the average number of trips and miles by automobile between the Baseline and Non-Driving periods as a way to quantify the reduction in driving, and this is described further in the next section.



## DATA ANALYSIS METHODS

### How Data Was Analyzed

Each participant (licensed driver) submitted a completed set of their previous week's travel diaries every Monday during each round. We set up a spreadsheet for each household for each week that combined the individual participants' data in their respective households to produce totals of the various data types by household. The following types of data were pulled from the diaries and entered for each household:

- each discrete trip made by every driver in the household,
- the date of each trip,
- the mileage of each trip,
- the mode used to make each trip,
- whether each trip was linked with another trip,
- and for the 2001 and 2002 round's Non-Driving period, whether the participant would normally have made this trip by car (i.e. whether or not it was a saved trip).

Each trip, whether saved or not, was also cross-checked in regards to being a driver or a rider (where a car was used as the mode) to assure that there was no overcounting or undercounting of total trips. For example, if a couple each submitted a separate set of travel diaries, one partner may have driven them both for a set of four errands on a Sunday afternoon. One may have listed that they were the Driver and the other was the Rider, while the other may not have noted that they were the Rider. Therefore, cross-checking allowed us to see the similarities in travel diaries and understand that in this example there were four trips rather than eight for that household.

After entering the various types of data, the following calculations were made weekly:

- the total number of trips taken using all modes was added up,
- the number of trips taken with automobiles was added up (owned cars, Flexcars, rental cars and borrowed cars),
- the number of miles by mode<sup>6</sup>, and
- the weekly total for each household was added to the running totals kept for every household and for the group as a whole.

For the Non-Driving weeks, the following additional calculations were also made:

- the total number of trips saved was added up, and
- the total miles of each saved trip were added up.

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<sup>6</sup> This data was pulled from the diaries in the 2001 and 2002 rounds only, not from the 2000 round.

## Comparison Method vs. Saved trip Method

As previously described, data was gathered during a Baseline period to aid in identifying behavior changes – especially the saved trips and mileage – as a result of using one-less-car, and Baseline period data was to be accepted as a sample of what true participant behavior would be had a household not been in the study. We anticipated that use of the remaining car (where applicable – in some cases households gave up their only car) would go up when households did not have access to their extra car, and we wanted to find a way to identify the extent of that trend. We hoped participants would show some reduction in total drive-alone car mileage and trips in the Non-Driving period compared with the Baseline, and we wanted to track the saved miles and trips. We developed two methods to determine saved trips and mileage: a **Comparison Evaluation Method** and a **Saved Trip Evaluation Method**.

For the **Comparison Evaluation Method**, we extrapolated their Baseline period data out to represent what would have been each household's number of car trips and car mileage during the Non-Driving period if they *had not* participated in the study and *had* been using all their cars as usual. We compared these figures to the actual car mileage, odometer readings, and number of trips they made during the Non-Driving portion of the study to arrive at figures for trips and miles saved.

When we had a last minute replacement recruit that resulted in less than the full number of days of data in a baseline week, we computed the average miles driven per day from the rest of their baseline data, and used this in place of the missing data. Similarly, when a participant was in the project for a partial week (such as when they were out-of-town for several days of vacation), we turned the number of days in the short week into a percentage and used it to take the place of the "missing" data.

For the **Saved Trip Evaluation Method**, we calculated the number of trips and miles saved based on what the participants reported on their detailed daily travel diaries (see example of the Travel Diary in **Appendix A: Worksheets and Forms**, page A - 4). For example, a participant would tell us they took a six-mile bus trip to the mall and indicate that it was a "saved trip" (see our definition of a "Saved Trip" previously described on page 25). We then added up the saved trips and miles based on what participants identified as such during the Non-Driving period.

After comparing the totals of the two methods, we felt the Saved Trip Evaluation Method provided more accurate data because we were concerned that the shortness of the Baseline periods (two or three weeks) may not provide a sufficiently accurate reflection of participants' typical car usage and trip behavior. Additionally, we felt confident of the Saved Trip Evaluation Method because participants kept sufficiently accurate and detailed diaries, including the Saved Trip data. For the 2000 Study, we especially felt the Saved Trip Method was superior due to the skewing of the Baseline data for households who experienced their Non-Driving period first, and then used their new transportation behavior in their Baseline period (refer back to page 20).

In general, using both methods to analyze the data was very useful and gave us interesting perspectives on behavior change (see the *On Evaluating Saved Trips* section of **Lessons Learned** on page 37). Please note that these methods for determining "saved trips" do not affect the data showing weekly mileage by mode in the **Report on Results** (Appendix C) because the data there shows all the actual trips made by whatever mode, not whether or not a trip was counted as a "saved trip" or not.

## Emissions Analysis

To determine the cost per ton of pollutants (carbon dioxide, carbon monoxide, nitrogen oxide, and hydrocarbons), and quantity per mile reduced, we first gathered data on the emission of air pollutants per mile. We went to the Environmental Protection Agency (EPA) web site, [www.epa.gov/autoemissions](http://www.epa.gov/autoemissions), for information about criteria pollutants emitted by motor vehicles per mile. The information is listed in grams so we converted to pounds (one gram = .002205 pounds). Another resource we used was the Environmental Defense's<sup>7</sup> Tailpipe Tally web site at [www.environmentaldefense.org/TailpipeTally](http://www.environmentaldefense.org/TailpipeTally)<sup>8</sup>. This allowed us to look up each participant's automobile year, make, model, emissions certification, together with an estimate of annual mileage driven (extrapolated from their diaries) to derive the pounds per year of various pollutants for their specific vehicle (these are the required fields needed to retrieve data on this web site).

Although this site gives us a total of pollutants for the year, we can divide the pounds of pollutants by the number of miles per year we have estimated the participant drives, and come up with the number of pounds per mile of each pollutant that each participant vehicle emits. These pollution per mile figures can then be used to develop information on the pollution saved per mile during the study. This required us to derive the number of miles per year driven by each participant by using the Baseline car miles per week, averaging them, and then multiplying by fifty-two to arrive at a number for annual miles driven to use in corresponding required field on the Tailpipe Tally website.

However, we felt this was not a reliable estimate for data in the 2000 round, given that we did not know which trips in the baseline period were outliers (e.g. a trip listed to Mt. Rainier or Portland might be an infrequent weekend getaway, or it could be a regular periodic occurrence). Therefore, we used the EPA's average automobile numbers on their web site for analysis of the 2000 round's data. For the 2001 round, we asked participants to note unusual or atypical trips in their diaries, so we could screen these out of the Baseline data figures, and we calculated emissions for each household's specific vehicle and miles driven.

To calculate emissions saved during each round, we multiplied the number of car miles saved in the Non-Driving period by the emissions per mile for each of the pollutants listed (carbon dioxide, carbon monoxide, nitrogen oxide, and hydrocarbons). This gives us the pounds of pollution a household saved by using non-car modes in place of car-dependent modes for specific trips. Then we totaled together each household's emissions saved for each pollutant, and this figure for total emissions saved across all households we used in the Final Results sheet for each round. We did this calculation for carbon dioxide, carbon monoxide, nitrogen oxides, and hydrocarbons. (Each household's Case Study lists their contribution to the group total reduction of these criteria pollutants – see appendix.).

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<sup>7</sup> home page at <http://www.environmentaldefense.org>.

<sup>8</sup> The website addresses provided are current as of May 2003, but may change over time.

## **Case Studies**

The results of each household's activities were put into brief case studies for use by the media and other interested agencies and cities. Each Case Study lists the individual household savings in automobile trips, automobile miles, and pounds of pollution, as well as cost savings and whether or not the household sold their extra car as a result of participating. Another feature in the Case Studies that is of interest to the media and related agencies are the comments from household members on their experience of being in the study, and what lessons they learned and permanent changes in their travel behavior they will make as a result. All of the participants reported that living with one less car was easier than they had anticipated and many spoke of the valuable lessons they learned about how to travel more efficiently. The Case Studies of all households are included in the appendix.

## LESSONS LEARNED

### **On Selecting Participants**

Selecting participants with just the right amount of motivation has been a challenge in all of the rounds. On the one hand, we wanted participants who understood and were onboard with the goals and reasons for the study because it is a commitment on their part to keep a detailed daily travel diary throughout the study period. For instance, some participants in both the 2001 and 2002 rounds had difficulty turning their diaries in promptly every week, and were even as long as several weeks late. While we eventually received them all, this behavior delayed and needlessly complicated our data entry, analysis, and stipend payment processes.

On the other hand, we also wanted participants who would maintain their typical behavior during the Baseline periods in order to get good baseline data. For instance, the participants in the 2000 round who were in the group where the Baseline period *preceded* their Non-Driving period were so excited to demonstrate to themselves and others that they could get along without an extra car that they tried to get along without both cars, thereby making the baseline data unusable. Others whose Baseline period *followed* their Non-Driving period were eager to demonstrate their new trip reduction behavior learned during their Non-Driving period and so continued this into their Baseline, making their baseline data unusable.

### **On Geographic Diversity**

Our desire to have a varied selection of neighborhoods, housing types, and income levels represented in the final participant group in each study encountered challenges. Applications to all rounds of the study tended to show high response from the same five or six neighborhoods north of the Ship Canal, and most were married (or comparably partnered) couples who lived in and owned a single-family home. These applicants were highly motivated, but since one of the goals of this program is to show that *all* Seattleites can achieve the same mobility with one car as with two, it was important to reach out to other areas of the city. Through the use of targeted efforts such as operating a booth at the Columbia City Farmers Market and the Central Area Community Festival, and placing community notices in community papers which primarily serve non-English-speaking populations, and in church bulletins which serve the African-American community, we saw modest increases in applications from residents in West Seattle, and to a lesser extent, Southeast Seattle. Participant households locations are on the following pages.

In the first two rounds (2000 and 2001) we felt we had to recruit and select applicants who did not meet our overall criteria as well in order to get geographical diversity. In the 2001 round, we did have at least four participant households who lived in multi-family dwellings (apartments) in denser neighborhoods, and we had two households which gave up their only car (out of twenty-three). In the third round (2002) we had substantially greater demographic and geographic diversity than previously:

- Some had high school, driving-age kids, some had small kids, and some had no kids.
- Some were couples, some were single people, and several were roommates.
- Some were homeowners and some were renters, some lived in single-family houses, some in apartments, and some in condos, and household incomes ranged from under \$40,000 to over \$75,000 per year.
- Some lived in areas with good transit service and neighborhood stores, others were in neighborhoods that made it more difficult to shop locally.
- Some worked in locations outside Seattle, and some worked near where they lived or even in their homes.
- and seven gave up their only car (out of forty-one).

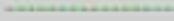
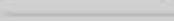
# LOCATION OF PARTICIPATING HOUSEHOLDS

## "WAY TO GO, SEATTLE" PROGRAM



Prepared by:  
Strategic Planning Office  
City of Seattle  
January 9, 2001

### LEGEND:

-  Participating Households
-  Seattle City Limits
-  Interstate Routes
-  State Routes
-  Arterials
-  Residential Streets
-  Bicycle Lanes & Trails



**HOUSEHOLD LOCATION OF  
SPRING 2001  
PARTICIPANTS**  
—  
**"WAY TO GO, SEATTLE"  
PROGRAM**



Prepared for:  
Strategic Planning Office  
City of Seattle  
September 21, 2001

**MAP LEGEND**

Location of Participant



Seattle City Limits



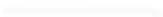
Interstate and State Routes



Arterials



Residential Streets



Bicycle Lanes & Trails



**HOUSEHOLD LOCATION OF  
FALL 2002  
FINAL  
PARTICIPANTS**  
—  
**"WAY TO GO, SEATTLE"  
PROGRAM**



Prepared for:  
Seattle Department of  
Transportation  
1300 4th Avenue  
Seattle, WA 98101



The contents of any maps,  
including accuracy, errors,  
or omissions, do not  
constitute the product.

**MAP LEGEND**

Household Locations for  
Final Participants:



Seattle City Limits:



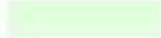
Arterials:



Residential Streets:



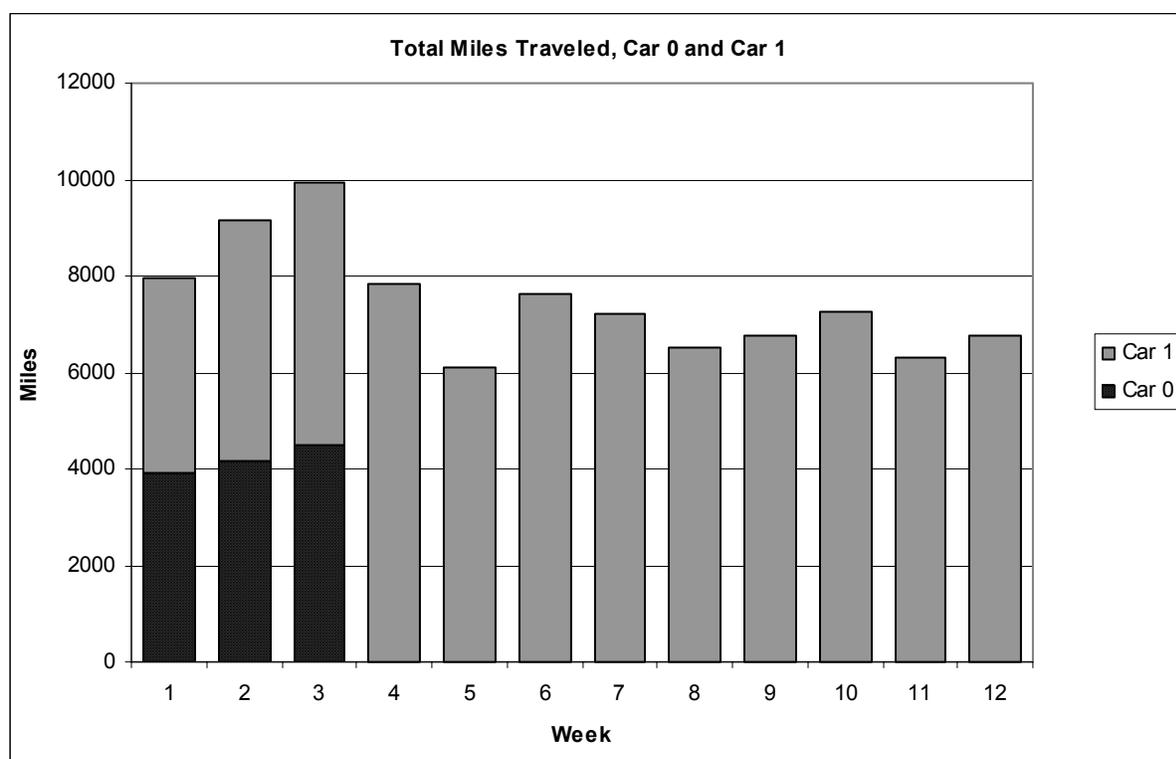
Parks & Green Spaces:



### On Driving the Remaining Car More

In the results from all rounds, we found that, in general, participants did use their first car more during the Non-Driving periods, though their overall car-dependent miles and trips made did decrease as compared to when they had their extra car available to them in the Baseline periods. The question of how participants changed the amount they traveled (as in stopped making some trips) as opposed to changing the way they traveled (as in consolidated trips or used non-car modes more) is one of the more important and difficult issues to analyze. The reality is that participants didn't do just one or the other.

Over the course of the Non-Driving weeks, every one of the participants cut back on a trip or postponed a trip, combined two trips that might have been made separately, and made some "normal" trips using different (non-car) modes of transportation. The evaluation questionnaires phrased this issue as a choice between two alternatives: Did they stop making trips? Or did they find other ways to make the same trips? The bottom line is, every participant could have answered "both," and many times, did just that. A more detailed response can be found in the **Report on Results** for the 2001 and 2002 rounds. In the 2000 round, some households relied mostly on the one remaining car to maintain their mobility, but due to previously described problems with the baseline data, it was not conclusive as to whether the additional use of the one car offset the overall reduction in car trips.

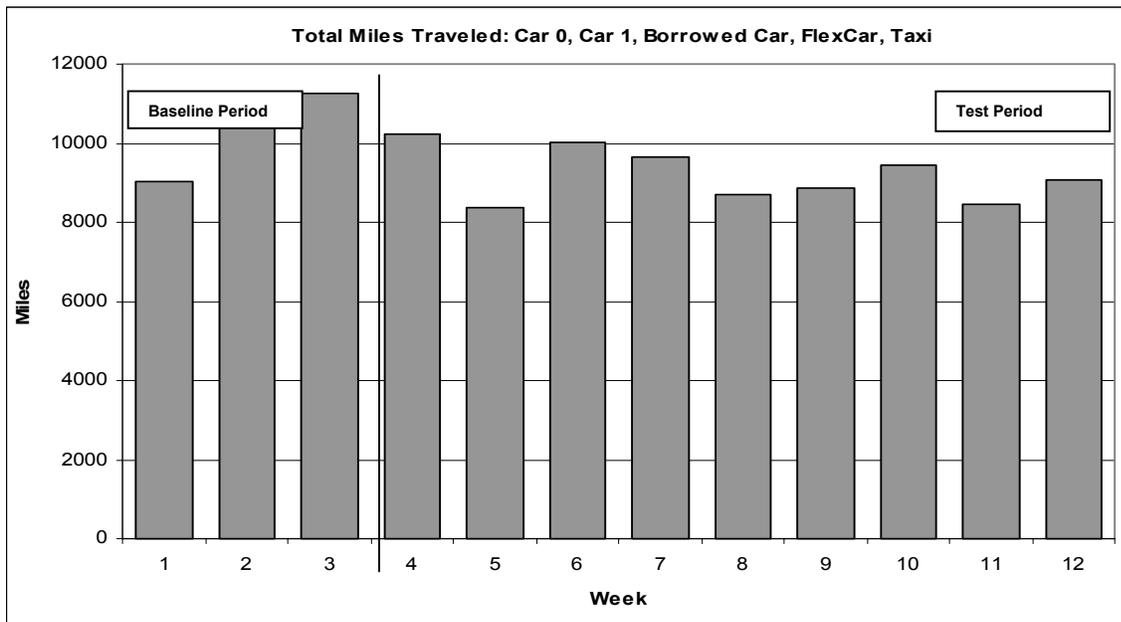


**Figure 14\*:** Total Miles Traveled, Car 0 and Car 1 in 2002 Round

Travel in "owned vehicles" (Car 0 and Car 1) during the 2002 round of the study is shown in Figure 14. Car 1 usage did increase significantly in week 4 so that it almost equaled the total use of Car 0 and Car 1 together in Week 1. But the mileage numbers show a total decrease in

\* Charts are numbered by their appearance in the "Report on Results" document for the sake of consistency.

owned-vehicle mileage in the test period. Participants drove their owned-vehicles an average of 220 miles per week per household in the baseline period, whereas in the test period, that number fell to 169 miles per week per household, representing a decrease of 23% in the use of owned cars. This means that, though the use of Car 1 increased when Car 0 was removed, the use of Car 1 did not increase so much that it equaled the total mileage driven using both Car 0 and Car 1, and that a real decrease in owned-vehicle mileage did result from living with "one-less-car."



**Figure 15\***: Total Miles Traveled by All SOV Modes, 2002 Round

Similar to the reduction in miles by owned-vehicles, there was a reduction in miles by all SOV modes (including owned-vehicles). Overall, all SOV usage dropped from 227 miles per week per household (in the Baseline) to 177 miles per week per household (in the Non-Driving) – a 22% decrease. Total SOV automotive transportation (Car 0, Car 1, Borrowed Car, Flexcar, Taxi) is not very different from transportation by Car 0 and Car 1, due to the fact that the relative number of miles traveled by borrowed cars, Flexcar, and taxis are very small compared to the miles traveled in owned-vehicles.

**On Getting Around with One Less Car**

Additionally, the ending evaluation questionnaire for the **2001 round** asked each household whether, in general, "Was getting around with 'one-less-car' more or less frustrating than sitting or being stuck in traffic?" The participants responded with a resounding "less frustrating":

- 15 Less Frustrating
- 3 More Frustrating
- 2 Ambivalent (yes and no)
- 3 Not Answered

\* Charts are numbered by their appearance in the "Report on Results" document for the sake of consistency.

The ending evaluation questionnaire for the **2002 round** asked the same question: “In general, “Was getting around with ‘one-less-car’ *more* or *less* frustrating than sitting or being stuck in traffic?” These participants also responded with a resounding “less frustrating”:

- 25 Less Frustrating
- 7 More Frustrating
- 6 Ambivalent (yes and no)
- 1 Not Answered

The Hust household expressed their experience in this way: “Definitely less frustrating! I hate car maintenance (sic) as much as I hate traffic. This study was a real eye-opener. I'm not afraid to take the bus more often! Joe takes the bus all the time. I was the more reluctant one, but now I see that it is much more relaxing and usually convenient. I am definitely a better planner – I schedule my errands for one driving day per week.”

Many of the 2001 participants had particularly enjoyable experiences giving up a car. The Kerr household says: “Ending the work day with a bike ride or run is fabulous, and often faster than driving!” And the Mincemoyer household comments: “I would say that being a bus rider on a regular basis became something I looked forward to. Aside from the freedom of the responsibility of a car, I enjoyed many good conversations on the bus and somewhat a sense of community with fellow riders. In a world in which it has become increasingly easy to become isolated from one another, I found this to be a welcomed difference.”

Or consider the O'Donnell household's response: “One of the many times I found myself biking along a beautiful trail after work instead of bussing up to my car and driving my car through stalled freeways and clogged side streets during rush hour. Getting out of the car allowed me to discover many new hidden corners of this city, corners that, even if I had happened upon before, I would not have appreciated behind a windshield. “ The Prenevost household adds: “The best experience was figuring out how great the Metro system is. You realize that the bus really isn't a bad way of getting around. It is also pretty convenient.”

Some participants had advice for others who might be considering getting by with ‘one-less-car’. The Mincemoyer household encourages others to try it, saying, “You'll be surprised at how carefree and stress-relieved you'll feel!” The Smith household also encourages people to experiment, saying that it is “easier that (sic) you think.”

### **On Evaluating Saved Trips**

In the 2001 and 2002 rounds, there exist differing viewpoints as to whether some households reduced VMT. Using the Comparison Method for evaluating Travel Diaries shows that, for example in the 2002 round, nine households increased their SOV VMT per week during the Non-Driving period when compared to the Baseline period (refer to page 28 for a description of the **Comparison Method vs. Saved Trip Method**). But using the Saved Trip Method, these same nine households show a weekly savings in miles driven during the Non-Driving period. As best as we can determine, both are true: these households did reduce the number of trips where they drove a car (as reflected in the Saved Trip Method) while at the same time they drove more actual car miles (as revealed in the Comparison Method). However, the rest of the 2002 participants reduced their weekly SOV VMT enough to more than offset the increased SOV VMT from these nine households, so there was a reduction in SOV VMT at the collective level.

The difference can be found between trips saved versus miles saved. These households saved trips, and the miles that go with those trips, by carpooling or using non-car modes, but they also increased the amount of miles driven on their “non-saved” trips. What is not altogether clear is why. Even if a household transferred all of their Car 0 miles to Car 1 during the Non-Driving period so that no VMT reduction resulted, why would there be an *increase* in car miles traveled during the Non-Driving period, as opposed to simply having the same amount of car miles traveled? For instance, were the saved trips made in a way that resulted in longer or a greater number of “non-saved” trips being made? Did they just travel different places in the Non-Driving weeks? Or are other factors at work? This suggests a benefit in determining if there are consistent household characteristics among both the households that reduced SOV VMT as well as those that increased SOV VMT while living with “one-less-car.” A public education campaign would, ideally, want to target only 70 percent of the households in the study who will reduce their SOV VMT, and avoid targeting the households who will increase their SOV VMT when reducing the number of cars they own.

Looking at the 2002 round, the Comparison Method shows three households (GADA, NEGE, and PESC) made very slight increases in car miles during the Non-Driving period, and six households appear to have driven significantly more miles per week on average during the Non-Driving period than the Baseline. In a couple of these latter cases (DNCH and STBO) these households turned out to have made possibly atypical trips during one or two weeks of the Non-Driving period that offset the VMT savings of their other Non-Driving weeks, but these questionable trips were hard to determine if they should be counted as atypical, and we chose to leave these miles in their diary counts.

For instance, during the Non-Driving period one household (STBO) made several round trips to a nearby city that they did not make during the Baseline period. These round trips added nearly 100 miles to their weekly VMT. Yet it was not clear that these trips were atypical, such as a weekend trip out of the area, nor was it clear that these round trips were part of a regular pattern of travel to the destination in question. They seemed atypical, but did not fit our definition of a “vacation trip” which should be screened out. Yet based on twelve weeks of travel records, they were not typical trips the household made.

In one case (RIER), a household member was unemployed during the Baseline period, and began working at a job in the second week of the Non-Driving period that required a commute trip to a nearby city – we suspect that if they had been employed in similar circumstances during the Baseline period, this household would have shown VMT reduction. In another case (OSTO) the household literally did not use Car 0 in the Baseline, and were therefore not a good subject for the study, but we only learned of their non-use of Car 0 through their Travel Diary records. In the other couple cases (HAMI and TDLI) the households really did drive more car miles during the Non-Driving weeks. Even so, the overall total average of saved VMT per week for the 2002 round is the best of the three rounds, at an average of 70 miles per household compared to an average of 63 miles in the 2000 round and an average of 55 miles for the 2001 round. This raises the question if this is because we increased the length of the non-driving part of the study. Perhaps the extended time with one less car meant participants discovered more transportation options over the nine non-Driving weeks.

### **On Improving the Diaries**

We received feedback from participants that the travel diaries were rather cumbersome, and some participants did not recommend extending the Non-Driving period in future rounds of the study for this reason. At the same time, many participants particularly in the 2001 round felt they were just getting settled in their Non-Driving period routines, and would like to have seen

that period extended, perhaps from six to nine weeks – and we did extend the length of the Non-Driving period in the 2002 round. Some participants in the 2001 round requested the ability to enter their travel data online, and we created that option for the 2002 round.

For the 2001 round we did create a way for diaries to be filled out as a word document and then e-mailed to us weekly. Half of the twenty-three households used this means, while seven faxed them in, and the remaining two mailed them in each week. One household created their own version of a computer-based diary using database software that allowed them to set up forms and clickable radio buttons for standard data columns (like Driver or Rider?). However, they were not able to e-mail these to us, and instead printed out the completed forms and faxed them in.

In the 2002 round, we created Excel spreadsheet Travel Diaries and an Online Travel Diary using the City's SQL Server Database capacities. Unfortunately, the Online Diary was not ready to be used until the sixth week of the study due to personnel changes beyond our control. By the end of the study 17 drivers (out of 78 drivers total in the 41 households) were using the Online Database, 41 were using the Excel Diaries, and the remaining 20 were using paper versions. We feel that if the Online Diary had been ready at the start of the study, many of the people who became comfortable using the Excel Diaries would probably have used the Online Diary instead, instead of the relatively low number who wound up using it. However, the fact that 75% of drivers used either the Excel or the Online Diary saved us tremendous amounts of labor for data entry as compared with the paper Travel Diaries.

### **On Odometer Readings**

Project staff took odometer readings of participants' Car 0 (the one they gave up during they study) at three points during the study: at the beginning of the Baseline period, at the Beginning of the Non-Driving period, and at the end of the Non-Driving period. In this way staff can guarantee that the car was not driven. For odometer readings of participants' second or third car (for those that had them) we relied on participants reporting the mileage at the same three points. We found that the mileage reported tallied well with the mileage reported in participants' Travel Diaries. Additionally we asked participants to report the odometer readings of all their cars on the six months later Follow-Up Survey. We perceive that participants have no incentive to misrepresent these readings as the financial incentive (study stipends) had ended with the end of the nine (or twelve) week study period.

### **On Changing the Stipend Structure to Reflect Actual Car Costs**

For the 2000 and 2001 rounds, a study stipend of \$25 per week per household was used for the Baseline weeks, and \$85 per week per households for the Non-Driving weeks, this latter amount reflecting the national average cost of owning and operating a second car. For the 2002 round, we used a stipend system that more closely matched participants' actual cost of car ownership. In the second round (2001), twenty-three households had car ownership costs that ranged from \$27 per week to \$147 per week, and which averaged to \$63.90 week. Based on this, for the third round we used a graduated scale of \$10 increments for stipend amounts during the Non-Driving weeks. Third round households with a weekly car cost between \$20 to \$29 per week would receive \$25 per week, those with a car cost between \$30 to \$39 per week would receive \$35 per week, and so on.

Averaging the actual 2002 stipend amounts together shows that the average car cost for round three households was \$81.95 per week. The change in the stipend amount would affect only the Non-Driving weeks of the study, not the Baseline Period for which participants in all rounds received a stipend of \$25 per week. Changing the stipend amount from a flat rate of \$85 per

week to one more closely approximating each household's actual costs creates more realistic economic circumstances for participant households.

### **On Stipends vs. Paying Participants**

During the first two rounds of the study (2000 and 2001) we stated we were "paying" households \$85 a week, the average cost of owning and operating a second car. We experienced some difficulties due to this language: some citizens contacted the program and asked why we weren't willing to "pay" them since they had stopped owning a car years ago; other people mistakenly believed we were preparing to launch a "full-fledged version" of this "pilot program" where we would begin to "pay" all households in Seattle to park their extra car, and that this was Seattle City Government's idea to end congestion. By the third round of the study we had clarified our language and were careful to always state that participant households received a "study stipend," partially in exchange for the substantial data collection they were providing in the daily Travel Diaries, and partially for the public benefit which the City was receiving in the form of less neighborhood traffic and congestion, reduced safety and injury risks, decreased costs of street maintenance, and better air quality through emissions reduction.

### **On Weather Influences**

We wanted to test the degree that weather affects participants' trip behavior. An unseasonably dry Winter in Seattle may have made our 2000 participants more willing to use alternative modes than they would have been had it been raining as much as normal, though there was a few weeks of significant rainfall. Running the 2001 round in the Spring and Summer might have artificially inflated the use of non-car modes of travel during both the Baseline and Non-Driving period because participants may have been more willing to use alternative modes simply because the weather was relatively drier compared to typical Fall and Winter weather. Having the 2002 round start in relatively good weather (in September) and progress into relatively less optimal weather (into late November), we might have expected to see more car usage towards the end of the Non-Driving period than at the beginning. However car usage during the Non-Driving weeks remained fairly consistent (see Report on Results for Fall 2002 for details).

Weather and other events in the seasonal calendar are among the reasons why the timing of the studies have been targeted for the Spring and Fall. Overall, anecdotally we have found that weather impacts the transportation choices of about half the households in all rounds. However, the amount of trips and miles saved in all rounds are essentially the same, which suggests that weather in Seattle is not a dominant factor influencing trip behavior. Even so, it has been challenging to set a schedule for a round that is both long enough to get good data and short enough not to encounter conditions which create unrepresentative data.

Weather as an additional variable involves complications that hinder a thorough and reliable statistical analysis. Weather of any kind does not arrive in a weekly pattern, which makes it difficult to analyze. Interestingly, precipitation during the 2001 round was generally never worse than a light rain. Only very few days were described as even having light rain. Three days had rainfall of half an inch or more, all in different weeks of the 2001 round. And during the 2002 round the total number of trips made by walking and bicycling were consistently higher in the Non-Driving weeks even though the Non-Driving weeks also had slightly though consistently higher amounts of precipitation than the Baseline weeks.

To better provide for an analysis of weather as an influence on transportation decisions perhaps a line could be added to future diary logs for a daily description of the weather.

The program evaluation questionnaires asked one weather-specific question:

“How much were weather and the time of year a factor in your choices? If it had been colder and rainier, would it have significantly changed your decisions (i.e. walking or taking a bus)?”

From the **2001 Ending Survey** responses, nine households concluded that weather was not a factor in their travel choices, while twelve households stated that weather was a factor that affected their decisions. (One of the evaluations turned in did not answer the question.)

Anecdotally, comments on how weather influenced travel decisions covered a wide range of attitudes:

“Yes. I hate walking in the cold, rainy weather.” [Atchison]

“This study has shown me how MUCH weather plays a part in the decision to walk or take the car. A car is a huge convenience when it is cold and/or raining. It’s a convenience though, not a necessity.” [Goodwin]

“Honestly, I do believe that weather would significantly change our decisions.” [Hoang-Braddock]

“No. Joe and I are both from Seattle. We like the rain. We did end up buying a few extra umbrellas!” [Hust]

“Yes! I am not sure that I could have completed the study if the weather was colder!” [Ichikawa]

“Weather had no effect. In the winter with the car it is a pain to scrape windows. But walking or taking the bus rain/cold not make too much difference - just dress appropriately.” [Nevue]

The **2002 Ending Survey** slightly changed the way the question was posed:

“How much was weather and the time of year a factor in your choices.”  
(Check one)

Hardly       Rarely       Sometimes       Often       Frequently

The thirty-nine 2002 surveys that had this question completed show the participants were more evenly divided on this question than in the 2001 responses, though still tending towards weather being less of a factor. A total of fourteen said weather was “Hardly” or Rarely” a factor, seven said weather was “Often” or Frequently” a factor, and most – eighteen – said weather was “Sometimes” a factor:

8 said Hardly  
6 said Rarely  
18 said Sometimes  
4 said Often  
3 said Frequently

### **On Children and School Year Influences**

The 2001 round was the only round that gives us comparison between travel behavior both during and after the school year due to its timing (May – July). The end of the school year did affect the two 2001 households who worked for the University; specifically their miles traveled decreased because they stopped commuting to work around the third week of June, in the middle of the Non-Driving period.

We analyzed the results for 2001 participant families with children in an effort to identify unique changes in transportation habits for this group. Specifically, we were interested in how the end of the school year may have affected trips and miles traveled, presumably for those participants with school-age children in particular. This analysis would not be relevant to families with children who are too young to be in school.

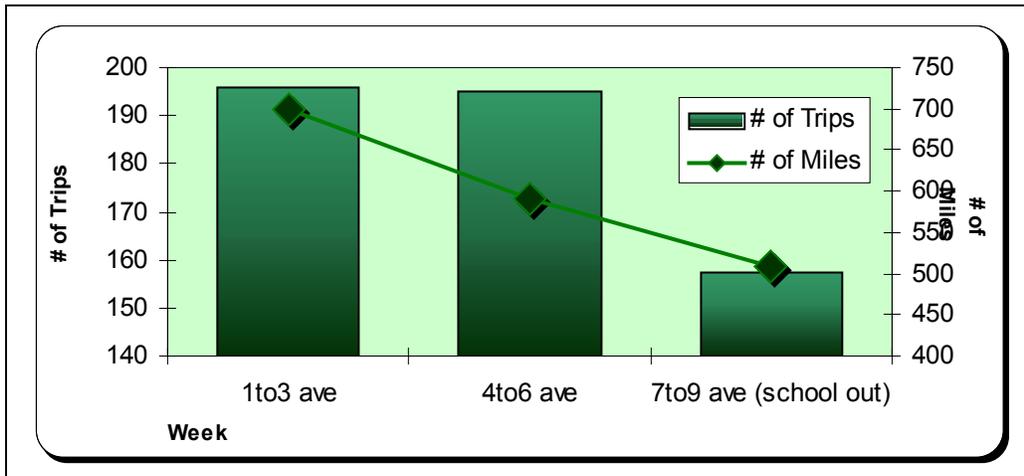
The following analysis therefore culls data for four families with school-aged non-driving children. According to the Seattle Public Schools' website, the last student day of the 2000-2001 school year was Friday, June 22, 2001. This was basically the end of week 6. Week 7 was therefore the first week of the summer vacation. The following table identifies the weekly average number of trips and miles driven during the Baseline period with school in session (weeks 1 - 3), the beginning of the Non-Driving period with school in session and using "one less car" (during weeks 4 - 6), and during the ending of the Non-Driving period with school out and using "one less car" (weeks 7 - 9).

<b>Weeks</b>	<b># of Trips</b>	<b># of Miles</b>
1 to 3	196	698
4 to 6	195	591
7 to 9	157	507

The preceding table shows that for this small group of participants with children attending school, the number of trips per week didn't change from the baseline period to the first three weeks of the test period. But once the school year ended, the number of trips for these households dropped nearly 20% to 157 per week.

For miles traveled, the relationships are different. The number of miles traveled dropped over 100 miles per week from the baseline period to the first three weeks of the test period. This indicates that the four families traveled fewer miles while making the same number of trips as long as their children were in school. Once the school year ended, the number of 'miles traveled' fell again, this time to an average of 507 per week, or roughly 27% less than the average during the baseline period.

The same data is represented graphically follows:



**Figure 21<sup>\*</sup>: Trips and Miles Compared: Families w/ School-Aged, Non-Driving Children (Spring 2001)**

The graph presents the weekly average number of trips and miles traveled for just the four participating families with school-aged, non-driving children. Week 7 of the study was the first week of summer vacation.

<sup>\*</sup> Charts are numbered by their appearance in the "Report on Results" document for the sake of consistency.



## CONCLUSIONS

### Evaluating the Goals and Hypotheses

The *Way to Go, Seattle!* Demonstration Study met its goals admirably:

1. **Reduced VMT and emissions:** In terms of  
*"reducing vehicle miles traveled and carbon dioxide emissions, and quantifying the number of VMT and pounds of CO<sub>2</sub> emissions reduced during the project,"*

we determined the design of the Demonstration Study was effective at reducing VMT and carbon dioxide emissions, and in quantifying the reduction. We were able to demonstrate the reduction in car trips and mileage by each household, and we were also able to quantify the reduction in pollution. Collectively participants did decrease their household VMT and carbon dioxide emissions. Additionally, the Study allowed us to quantify Transportation Demand Management (TDM). We can document the actual miles not driven as result of investment. The Study has really shown that individuals can make a difference.

Results show that in many cases households were able to give up one of their cars with relative ease by making smart transportation choices including bussing, biking, walking, carpooling, car-sharing, taxi rides, and trip consolidation. A majority of households reduced drive-alone trip mileage by using other modes or trip consolidation. In the combined results of 2001 and 2002 studies, when compared against their baseline travel behavior, there was a 27% decrease in overall drive-alone vehicle miles and 30% decrease in overall number of drive-alone trips per week, with a 30% increase in overall miles traveled using non-drive-alone modes, and increase of 53% in the number of trips made using non-drive-alone modes per week. For example, in the 2002 round, transit use increased by 125%, bicycling by 38%, and walking by 30%. More simply said, participants reduced auto trips and mileage yet still had the mobility they desired and got around other ways instead.

An argument can be made that we have not captured the true baseline behavior of the study's participants. As we know from the evaluations and correspondence, participants began making more conscious and intelligent travel decisions even before the study formally began. Some people even sold their second cars based on nothing more than the vehicle cost analysis provided as part of the intake for the 2001 round. It seems **the Way to Go, Seattle!!** project creates a better traveler before the traveler's behavior can even be measured. Perhaps the program is underselling its own impact, since the variation between baseline and test period behavior could be much greater than it is.

2. **Education:** In terms of  
*"raising public awareness of the cost of driving<sup>9</sup>, and encouraging Seattleites to think about their auto trips and car usage,"*

just from hearing about the project, people are selling their cars! When we contacted households to participate in the 2001 round, we had four households decide to promptly sell their second cars and start realizing the savings immediately. Some of the families made

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<sup>9</sup> Patrick Hare & Associates go on to note that "Transit and occasional car rental cost about \$1,300 a year. Middle and lower income Americans can save more than \$3,000 a year, net, by giving up a second car for transit and occasional car rental. For many households, that will mean a 10 percent increase in disposable income. If taking transit adds thirty minutes each way to a commute, or an hour a day for 250 days a year, and saves \$3,000 a year, you can pay yourself \$12 an hour to give up a second car and sit on transit" (1996, Maryland).

the decision to sell their cars after hearing how much other families saved, others made the decision after they filled out our new Car Cost Worksheet that helped them calculate how much money they would save each month if they gave up one car. Nationally, the Federal Highway Administration (FHWA) has already called commending us on our innovative approach in this Study because Seattle is helping people become aware that their transportation decisions are economic decisions. FHWA awarded us a \$100,000 grant that supported the study and allowed it to be packaged for replication in other Cities.

3. **Multi-modal Network:** In terms of

*"promoting a seamless transportation network that includes buses, regional rail, car and van pooling options, ferries, car-sharing programs, taxis, telecommuting, bike lanes and facilities, pedestrian improvements, and automobiles,"*

the study met this goal in the substantial media attention it received. Stories about the Demonstration Study have aired on CNN, ABC's World News Tonight, and major Seattle television and radio stations. Both daily Seattle newspapers and several neighborhood papers have written stories about **Way to Go, Seattle!**, and stories have gone out on the Associated Press wire, ensuring that many dailies throughout the country ran the story. Project staff were interviewed by the BBC for their International newscast, and we have had several inquiries about the **Way to Go, Seattle!** Demonstration Study from throughout the country and the world. We had 200 applicants for the Fall 2000 round, over 90 for the Spring 2001, and around 120 applicants for the 2002 round from cities throughout the Puget Sound region, and many Seattle residents commented on the project to the Mayor's Office. Through the public education campaign that will be an outgrowth of the Demonstration Study and other **Way to Go, Seattle!** efforts, we will continue to make progress in educating Seattleites about their transportation choices.

News of the study has spontaneously prompted area residents to sell their car as evidenced in this e-mail correspondence from Joelle Burgess to the former Mayor Paul Schell:

"Way to go, Mayor Schell. This is wonderful. GREAT work! Thank you for all the times you choose programs and promote ideas that help us walk more gently on the earth. As a native Washingtonian and a current Seattleite, the environment is my number one priority and I try to live my life with the Earth's health as my top priority. I fully believe that human health and welfare are inextricably linked to environmental health, and I am deeply concerned for all the non-human species on our planet. In the spirit of your e-mail, my husband and I recently sold our second car and bike/bus to work on a regular basis<sup>10</sup>."

4. **Cost Savings from Auto Independence:** In terms of

*"increasing recognition of an idea already built into the City's co-sponsored Location Efficient Mortgage program – that living close-in and close to work can mean less transportation cost (no second – or even first - car needed), and therefore in-city living is not as expensive as housing prices alone would indicate,"*

all of our participants recognized that in-city living affords them the opportunity to go without another car (and use the money they would save on other things) due to the availability and viability of alternate transportation modes. Between all three rounds, eighteen out of ninety

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<sup>10</sup> E-mail dated July 23, 2001 in response to Mayor Schell Mail #109 describing the **Way to Go, Seattle** project and Demonstration Study.

households (eighty-six households in the study proper plus the four who sold before the start of the second round), or 20%, sold their “extra” car after participating in the study or during the selection process, and two of those households sold not one but *two* of their “extra” cars! We hope to utilize the Case Studies to show all Seattleites that living and working in the same city can be a cost saving measure.

The **Way to Go, Seattle!** Demonstration Study bore out three of the four hypotheses.

1. **Mobility:** In terms of

*“households will discover they can have the mobility they desire while owning and operating fewer cars if they make use of all the transportation options available to them. If households plan their trips better and re-evaluate how they think about their transportation choices, they can achieve the same level of mobility with fewer cars,”*

the relatively little change in average number of trips per week between the Baseline and Non-Driving periods confirms that participant households found they could maintain the level of mobility they desired, and therefore in general reduced VMT by getting places different ways. The average number of trips per week by all modes decreased slightly between the Baseline and Non-Driving periods in the second round (2001) from 1,148 to 1,082, and increased slightly in the third round (2002) from 2,433 to 2,554 (we have previously described the skewed data issues with the first round in 2000 and so do not include that data here).

Additionally, we received many comments to the effect that it was much easier to do without the car than participants had anticipated. We received several comments about how not having the car showed participants how much travel they were doing that was not the best use of their time. This quote is an example:

“I have learned that having a car, for me, is tied to being more consumption oriented. It turned out to be a positive to not have a car to ‘pop’ into for some shopping trip that I didn’t really need to go on in the first place.”

2. **Price Change:** In terms of

*“households will shift from a fixed cost transportation situation (with about 80% of the cost of automotive usage being fixed) to a pay-as-you-drive model that includes transportation alternatives, car-sharing, and taxis. When people have a car readily available, they tend to think that using it is free, since the up-front costs are already paid and each trip incurs few additional costs. As the study raises the awareness of participants about the actual costs of car ownership, they will more realistically evaluate the financial costs of the various modes of transportation available, and will use other modes to realize financial savings. Households will find the cost comparison between car ownership and other modes so compelling that they will opt to sell their second car,”*

the dramatic modification in car ownership - three of the twenty-two Fall 2000 households, nine of the twenty-three Spring 2001 households (including the four who sold early and opted out), and six out of forty-one Fall 2002 households – confirms this hypothesis (see the following **Analysis Highlights** section for details). Most participants saved money, but some noted that since they have older cars, the license, registration, and insurance costs that would normally be much higher for a newer car were not as high for them. Even so, many participants will not replace those older cars when they finally wear out, and some sold them at the end of the study in spite of their relatively low ownership costs. The study

also showed that not owning a car results in much higher cost savings and VMT reduction than merely reducing car use.

3. **Reduced VMT and emissions:** In terms of  
*"a reduction in VMT and CO<sub>2</sub> emissions will result through reduced car ownership as well as through changed behavior in transportation choices. Households which operate fewer cars will rationally eliminate some car trips, either by choosing another mode or by eliminating some trips altogether. Regardless of whether they reduce their car ownership, households participating in the study will demonstrate changes in transportation choices due to the information and experience of using non-SOV mode choices gained during the study,"*

the study produced both reduced car ownership (as just described) and changed behavior - twenty-eight out of thirty-four respondents of the 2002 Follow-Up Survey, or 82%, indicated they were continuing to drive only somewhat more than during the study (only up to 30%), and six of the forty-one 2002 households sold their extra car, and another seven are considering doing so or modifying their car ownership (see **Long-term Results and Lasting Changes** section which follows for details).

Many CTR programs emphasize driving "one less car trip per week." This study demonstrated that when households don't have the extra car to fall into using, they are much more conscious about how they get around and what trips they need to take. Not owning a car results in much higher VMT reduction than behavior change education programs, although, of course, it is a much bigger decision.

4. **Reduced Parking Requirements:** In terms of  
*"reduced car ownership lowers parking demand in residential buildings which supports reducing multi-family housing parking requirements,"*

the data from this study alone does not support lowering parking requirements in a particular neighborhood. However over the long term, if our efforts to raise the awareness of the cost of car ownership are successful, there is potential to quantify the results in support of reducing the parking requirement in an effort to make housing more affordable.

## Analysis Highlights

More information and details on a wide variety of statistical results and data analyses may be found in the **Report on Results** for the Spring 2001 and Fall 2002 **Way to Go, Seattle!!** Demonstration Study. Although we have the data and spreadsheet analyses for all three rounds, we decided to fund a full report on the 2001 and the 2002 rounds because their data collection incorporated improvements to eliminate the atypical results in the 2000 round noted earlier (refer to page 20), although where possible results from the 2000 round were also summarized. From the highlights profiled here, it's apparent that the results of all rounds are closely similar – though not identical – and we feel the 2001 and 2002 results are sufficiently representative of the study to stand alone in their respective **Report on Results** documents.

### On Applicability to Seattle's Population

Our participant group had a variety of family configurations (single people, couples, with kids, without kids), ages (young adults to senior citizens), housing arrangements (home-owners, renters), income levels (from around \$40,000 annual income for a family of four to over \$75,000), and resided in various areas and neighborhoods of the city, and their participation showed that in many cases a participant family with any of these characteristics could live successfully with “one-less-car.” However, we feel more research would need to be done before we could confidently generalize our results to Seattle's population as a whole. There are too many other factors to take into consideration than what we could evaluate in the limited scope of our study and its small participant group.

For instance, our participant group was disproportionately made up of households who earned above the median income, and did not have a racial/ethnic make up reflective of Seattle's. (See lessons learned on selecting participants.) Additionally the overwhelming majority of participant households owned two cars, yet only 40% of Seattle's households own two or more cars. The clear majority of our households were couples, yet 40% of Seattle's population is one-person households. Likewise close to half of our participant households had one or more children under the age of 18, compared with only 13% of Seattle's households. Even so, that households with so many differing characteristics could on a collective level reduce the amount of drive-alone trip miles is encouraging, and suggests further study to identify the optimal types of households to target for a public education program based on the study.

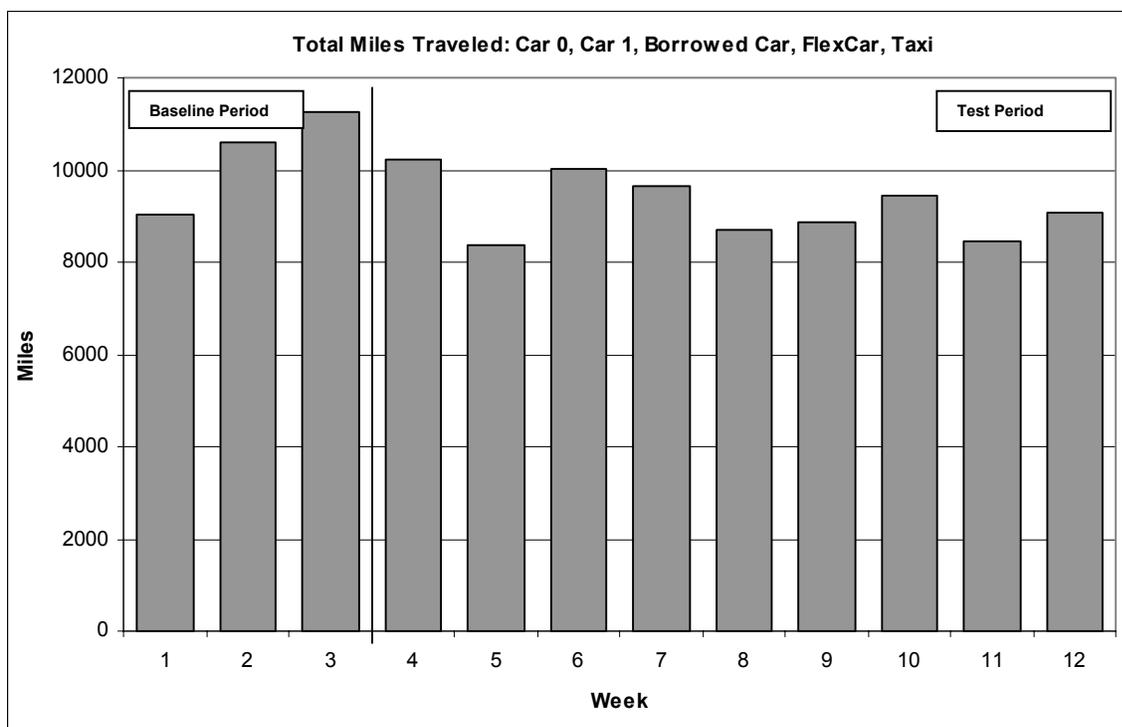
### On Reduced VMT and Pollution

In all three study rounds participant households reduced VMT and CO<sub>2</sub> and other emissions through reduced SOV trips. The twenty-two households in the **2000 round** made nearly 1,700 fewer car trips and drove 8,100 fewer miles during the six weeks of their Non-Driving period. This equals around 300 fewer trips and about 1,400 miles not driven per week. The reduced driving by just these twenty-two households for six weeks also meant about 6,500 fewer pounds of CO<sub>2</sub> were pumped into the atmosphere. If you convert the un-emitted CO<sub>2</sub> to a volume measure you can picture this as about three six-lane swimming pools of pollution, or if you were to condense that CO<sub>2</sub> into elemental carbon, like charcoal, you would have 175 ten-pound bags of charcoal.

In the **2001 round**, the twenty-three households in their six Non-Driving weeks reduced 1,200 automobile trips in our neighborhoods and 7,600 miles of neighborhood traffic, and kept 6,100 pounds of CO<sub>2</sub> from being emitted into our atmosphere. That breaks down to just over 200 car trips saved each week, 1,200 miles not driven per week, and just over 1,000 pounds of CO<sub>2</sub> not put in our air. If you convert the un-emitted CO<sub>2</sub> to a volume measure, you'd have approximately 52,650 cubic feet of greenhouse gas pollutants. If that CO<sub>2</sub> were compressed into

elemental carbon such as charcoal, it would fill more than 167 10-pound bags or be equal to roughly three six lane swimming pools of greenhouse gases, by volume.

In the nine Non-Driving weeks of the **2002 round**, the forty-one households made 5,103 fewer automobile trips in our neighborhoods and generated 25,763 less miles of neighborhood traffic<sup>11</sup>, and reduced CO<sub>2</sub> emissions by 17,598 pounds. That breaks down to just over 567 car trips saved per week, 2,863 miles not driven per week, and almost 2,000 pounds of CO<sub>2</sub> not put in our air each week. If you convert the un-emitted CO<sub>2</sub> to a volume measure, you'd have approximately 143,000 cubic feet of greenhouse gas pollutants. You can picture this as about nine six-lane swimming pools of pollution, or if you were to condense that CO<sub>2</sub> into elemental carbon, like charcoal, you would have 480 ten-pound bags of charcoal. The overall total average of saved VMT per week for the 2002 round is the best of the three rounds, at an average of 70 miles per household compared to an average of 63 miles in the 2000 round and an average of 55 miles for the 2001 round.



**Figure 15\* : Total Miles Traveled by All SOV Modes, 2002 Round**

*Overall, all SOV usage dropped from 227 miles per week per household (in the Baseline) to 177 miles per week per household (in the Non-Driving) – a 22% decrease. Total SOV automotive transportation (Car 0, Car 1, Borrowed Car, Flexcar, Taxi) is not very different from transportation by Car 0 and Car 1, due to the fact that the relative number of miles traveled by borrowed cars, Flexcar, and taxis are very small compared to the miles traveled in owned vehicles.*

<sup>11</sup> That's enough miles saved to drive all the way around the Earth!

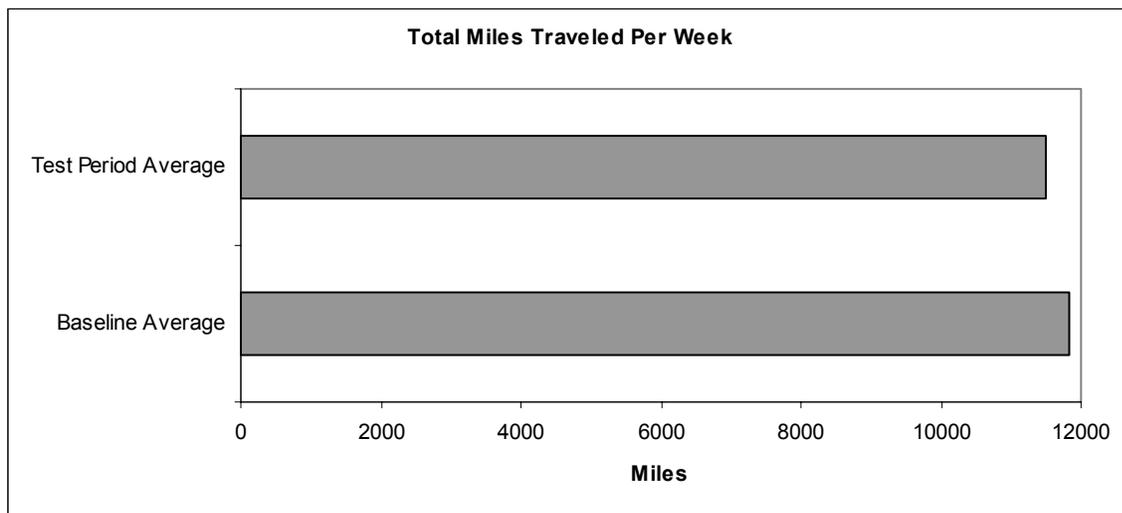
\* Charts are numbered by their appearance in the "Report on Results" document for the sake of consistency.

Combining the three rounds of the study together, the 86 household participants reduced total miles driven by over 41,463 in their collective Non-Driving periods, or an average of 1,974 miles not driven per week, or 482 miles saved per household. Likewise, participants collectively saved a total of 8,003 fewer car trips in their Non-Driving periods, or an average of 381 fewer trips per week, or 93 fewer trips per household. Finally, the eighty-six households reduced total CO<sub>2</sub> emissions by 30,198 pounds in their Non-Driving weeks, or an average of 1,438 pounds per week, or 351 pounds per household. You can picture this as about 15 six-lane swimming pools of pollution by volume or if you were to condense that CO<sub>2</sub> into elemental carbon, like charcoal, you would have 822 ten-pound bags of charcoal.

**On Retaining Mobility**

There was relatively little change in average number of trips per week between the Baseline and Non-Driving periods. This demonstrates that participant households found they could maintain the level of mobility they desired, and therefore in general reduced VMT by getting places different ways. The average number of trips per week by all modes decreased slightly between the Baseline and Non-Driving periods in the second round (2001) from 49.9 to 47 trips per household per week, and increased slightly in the third round (2002) from 59.3 to 62.2 per household per week.

The following chart above shows average weekly miles traveled by all modes. As you can see, there is virtually no reduction in the miles traveled per week in the test period as compared to the baseline, which means people continued to make all their same trips but used non-single occupant vehicle modes (non-SOV) more heavily. A decrease in total travel would be expected after the loss of the primary car, but participants' total travel decreased by only 3% when Car 0 was removed (and as noted in the previous chart above, there was 22% decrease in miles traveled by all SOV modes which means that people continued to go where they usually went, yet did so by using non-SOV modes).



**Figure 12\* : Miles Traveled per Week by All Modes, Baseline vs. Test Period 2002**

\* Charts are numbered by their appearance in the "Report on Results" document for the sake of consistency.

### **On Selling the “Extra Car”**

Most households found they saved an average of \$70 a week getting around by alternate means of transportation, and they all decided they would save money if they didn't own their extra car. Each household also discovered they could still get around without using their extra car, though in each round of the study, a few households found the obstacles to doing so sufficient enough to make the extra car practical for their current life circumstances.

After concluding the **2000 round**, three participants sold their extra car, three participants are intending to sell their cars at some point, and four participants were pretty sure they wouldn't replace their older car when it got old and stopped running. Additionally, one household plans to sell their second car when they retire in about two years, and another is considering this.

At the conclusion of the **2001 round**, three households sold their extra car within six weeks, two more sold it within six months of the study's end, one more is still thinking about selling it, three more most likely will not replace it when it wears out, one household replaced it with a more fuel efficient hybrid vehicle, and one more is thinking of doing the same<sup>12</sup>. Additionally, four finalist households sold their extra car shortly before the study began (thus opting out of the study)<sup>13</sup>.

At the end of the **2002 round**, three households sold their extra car within six weeks and received incentives – one of whom sold their *only car*, and another three sold it within six months without the incentives, five more are thinking about selling it, and two are considering replacing it with a more fuel efficient model<sup>14</sup>.

Among all three rounds, eighteen out of ninety households (eighty-six households in the study proper plus the four who sold before the start of the second round), or 20%, sold their “extra” car after participating in the study or during the selection process, and two of those households sold not one but *two* of their “extra” cars!

One of the households who sold their extra car within six months of the end of the 2002 study had this to say:

“I do believe it was the study that propelled us into selling the other car – we already knew all the environmental/good citizen reasons and were glad to be reminded, but we hadn't realized we'd also save so much on the insurance costs” (Hall-Thames).

### **On Incentives for Selling the “Extra Car”**

In 2001 participants were offered incentives of *both* an annual Metro Transit pass *and* one year of Flexcar membership if they sold their extra car at the conclusion of the study, and the incentives for the 2002 round were *either* an annual Metro pass *or* one year of Flexcar membership. No incentives were offered to the participants of the 2000 round. Even so, only the three of the 2001 households who sold their car at the end of the round were eligible for the incentives (the same number as those who sold at the end of the 2000 round), as were the three 2002 households who sold their car at the end of the 2001 and 2000 rounds.

Additionally, one of the things we tested for was whether an incentive to sell within a time period resulted in more participants making the decision to sell. In the 2001 round we waited until the

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<sup>12</sup> Also, one of the households who sold at the end of study sold another car within six months, and is now down to one car - they were the only 3-car, 3-driver household in the study.

<sup>13</sup> One more also sold their third car before the study began but still participated by giving up one of their two remaining cars.

<sup>14</sup> During the 2002 round, one household had their Car 1 break down, and chose not to repair it and so became a one-car family for real. On their completed six months later Follow-up Survey, they indicate they have sold the extra car and not replaced it.

end of the Non-Driving period to tell participants that we were offering an incentive if they sold their extra car within the six weeks following the conclusion of the Non-Driving period (at the end of the study). In the 2002 round we told participants at beginning of the study (at the start of the Baseline period) that we would offer incentives if they sold their car within six weeks of the last week of the Non-Driving period (at the end of the study).

After concluding the **2000 round**, three participants out of twenty-two sold their extra car with no incentives offered. At the **beginning of the 2002 round**, four households sold their car before the study began and opted out of the study - with no other financial reward than the money they would save by not owning the car based on filling out the Car Cost Worksheet. At the **conclusion of the 2001 round**, three households out of twenty-three sold their extra car within six weeks and received the incentive, and two more sold it within six months of the study's end without receiving the incentive. And at the end of the **2002 round**, three households out of forty-one sold their extra car within six weeks and received incentives – one of whom sold their *only car*, and another three sold it within six months and received no incentives.

Altogether out of the second and third rounds (where incentives to sell the extra car were offered at the end of the study period), only six households out of sixty-four (or 9%) sold their extra car in time to take advantage of the incentives. Another five (or 7%) sold their extra car within six months of the end of the study (but too late to receive incentives). Additionally, four more sold their car before the start of the second round with no knowledge of the incentives that were to have been offered. Therefore we conclude that these incentives had little to no effect on participants' decision of whether to sell their "extra" car at the end of the study period, and if anything, waiting until the end of the study to inform participants about the incentives for selling their car might produce better results than informing them of the incentives at the beginning of the study.

### **On How Participants Spent Their "Savings"**

One of the questions we asked participants at the end of the third round was, "How did you spend the weekly 'savings' from using one-less-car?" Here is a sampling of their responses:

"We used the money we 'saved' to have milk and veggies delivered to our home and we continue to do this."

"(We went out) to dinner in downtown Seattle on Friday nights and then took the bus home together."

"We are investing the money along with our wedding gift money for our soon to be born child (any day now)."

"We saved for a down payment on a house."

"We purchased a programmable thermostat to help reduce our heating expense, and put the rest towards lodging for a fun trip to New Orleans."

"(The money we) saved will go towards starting up a small online business for my partner."

"We save it – and collected a wee bit of interest. Then we put that towards a new laptop computer for my partner."

"We are still sitting on it. We plan to spend it on a fun trips, perhaps to Idaho . . ."

“(We plan to spend it) on a trip to Scotland.”

“We saved the extra money. We have it in a separate account. We were playing with the idea of buying new bikes for each of us - Cannondale if possible.”

“Paying for taxis was the biggest new expense, plus household expenses.”

“I'm not sure what we did with the saved money. It just seemed to disappear like the rest of our income. Seriously though, we definitely did save money, even when additional bus and taxi rides are accounted for. We didn't create any special fund for the saved money, but it's fair to say it generally improved our household finances, allowing us to pay down debts, take more vacation, or enjoy more entertainment. All of these increased our standard of living in ways that the extra car does not.”

“I purchased a 50cc scooter (that gets 100 miles to the gallon) as I realized driving my boat-like car around is expensive (gas and service-wise) and seems like such a waste when its just me and I can make a simple trip to shop on my scooter with a backpack. I also purchased some new components for my bicycle to continue my pattern of commuting (bike, bus, bike) to work.”

“We:

- bought a monthly bus pass.
- used part of it for our daughter's insurance payment.
- used part of it for our daughter to fly home from school in Pullman, WA rather than drive.
- used it to eat out several times.”

One participant split it between making a large Flexcar payment, making donations, and covering household expenses.

## Cost Effectiveness

The One-Less-Car Study encouraged participants to get by with 'one-less-car' and to record their travel behavior in exchange for a stipend which averaged \$85 per Non-Driving week across all rounds. The information provided by the participants showed that trips, miles traveled, and automobile emissions were all reduced during the Non-Driving period where they gave up their "extra" car. We calculated the cost of the program on a per trip-saved, per mile-saved, and per pound of emissions-saved basis. (Note: the costs do not include ongoing behavior change benefits realized after the conclusion of each round of the study.)

There are many ways to calculate the cost of benefits achieved during the Study. Below we have summarized the cost of the benefits realized just during the weeks the study was running (either nine or twelve weeks depending on each round's duration). The cost of incentives for the participants in the 2000 study was \$11,670. The cost of incentives for the 2001 study was \$13,345 (which had one more household, and a one week longer baseline period). The cost of incentives for the 2002 round was \$34,685, and this round had almost double the participants and a three-week longer Non-Driving period. The remaining \$104,500 in the budget went to operating costs (such as program administration, data analysis, and report development) and producing a replicability kit for other jurisdictions to be able to implement this study.

### Cost of Benefits - During the Demonstration Study Period

	<u>Fall 2000</u>	<u>Spring 2001</u>	<u>Fall 2002</u>
Total Costs <sup>15</sup>	\$50,000 Local City funds	\$50,000 Local City funds	\$130,000 FHWA grant includes replicability package costs
# of Participant Households	22	23	41
Subtotal of Incentives Cost	\$ 11,760	\$ 13,345 <sup>16</sup>	\$ 34,685 <sup>19</sup>
Trips saved	1,700	1,214	5,103
Miles saved	8,100	7,600	25,763
Lbs Co2 saved	6,500	6,100	17,598
Cost per Trip <sup>17</sup>	\$ 6.92	\$10.99	\$ 6.8
Cost per Mile	\$ 1.45	\$ 1.76	\$ 1.34
Cost per lb of CO <sub>2</sub>	\$ 1.81	\$ 2.19	\$ 1.97

<sup>15</sup> Operating and incentive costs. Cost of replicability package in 2002 approximately \$10,000.

<sup>16</sup> 2001 and 2002 incentives include end of project bus pass/ Flex car incentives for selling car at end of project.

<sup>20</sup> Costs based on incentives and just the direct study benefits, and does not include ongoing behavior change benefits.

## Longer-term Results and Lasting Changes

We believe the study can show there are long-term benefits. According to the evaluation conducted by Todd Litman (Victoria Transportation Policy Institute) and Todd Slind (CH2M HILL), "This project appears to be an excellent way to convey the message that typical Seattle households can reduce their automobile ownership and use, and be better off overall as a result. The two projects (rounds two and three) were well received by participants and the public, and resulted in a surprising number of households giving up an extra car. Unit costs of the project are likely to decline over time with greater experience<sup>18</sup>."

As noted earlier in the **Conclusions** section, most participants in the study plan to continue to drive less, and 20% have sold their car or have indicated they will significantly modify their car usage and ownership. In the Follow-Up Surveys virtually all respondents indicated they think more consciously about how they get around and more often consider whether they need to drive or could get where they need to go by another mode.

### Participant Motivation

Based on responses to the six-month later Follow-Up Surveys administered to the 2001 and 2002 participant group, the study identified sustainable motivations to be primary factors in participants' willingness to try living with "one less car. The ability to reduce pollution, the reduced stress, frustration, and time saved by using their car less, the availability of non-car modes, and the savings realized are rewards participants can experience each time they replace a car trip with another mode. This suggests that participants experienced a motivational reward factor sufficiently strong while trying out the one-less-car lifestyle to continue it past the end of the study where they were receiving weekly stipends, and thus behavior changes and raised awareness developed during the study continue to generate long-term benefits.

In the **2001 round's** Follow-Up Survey, the top five reasons listed for continuing trip reduction behavior are:

1. Because we want to pollute less.
2. (Tie) Because of the reduced frustration and/or time saved by using our car less, and Because of the ease of use and /or availability of modes of travel other than our car.
3. Because of the money we save.
4. Because of health benefits of using our car less.

In the **2002 round's** Follow-Up Survey, the top five reasons listed for continuing trip reduction behavior are:

1. Because we want to pollute less.
2. Because of the money we save.
3. Because of health benefits of using our car less.
4. Because of wanting to live more simply and "discover" our neighborhood and/or city.
5. Because of the reduced frustration and/or time saved by using our car less.

We note that the motivation of "Because of the money we save" is the third reason listed in the 2001 round and the second reason in the 2002 surveys. However we are unsure of how the households are saving money, since many of the households in both these rounds had not, as

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<sup>18</sup> Page 31, *Way to Go, Seattle!* Program Evaluation Summary Report. July 2002.

of the time of the Follow-up survey, sold their extra car – they would still have their monthly car costs plus whatever costs of using alternate modes. Perhaps they are realizing sufficient savings from reduced refueling due to reduced car mileage to offset the (relatively small) cost of alternate modes – but we don't have the information to know this for certain.

We also note that in both rounds, the same four motivations appeared in the top five reasons to continue the trip reduction behavior practiced during the study, although the relative order of these four motivations are different with the exception of "Because we want to pollute less."

**Continuing Behavior Change**

The Follow-Up Survey administered six months after the 2001 and 2002 studies ended shows sustained VMT (and therefore CO<sub>2</sub> emissions) reduction due to participation in the study – 83% of households who completed the surveys had not returned to pre-study levels of Car miles traveled. And the sustained reduction in VMT took place even in households who did not sell their car at the end of the study.

Question #6 (on the **2002 survey**) asked participants:

"As compared to ***during the portion of the project using "one less car"***, do you feel your household is driving: *(Circle the number that best describes your situation.)*"

1	2	3	4	5	6	7
A lot less than during the project (up to 60% less)	Somewhat less than during the project (up to 30% less)	The same amount as during the project (equal to using "one less car")	Somewhat more than during the project (up to 30% more)	A lot more than during the project (up to 60% more)	The same amount as <b><i>before</i></b> the project	More than <b><i>before</i></b> the project (over 100% more)

Thirty-four out of forty-one households in the 2002 round completed this question in the survey. Out of those, ***twenty-eight***, or 82% of respondents, ***indicated they were continuing to drive only up to 30% more than during the Non-Driving Period of the study*** even though a total of only six households sold their car.

The **2002 responses** are:

2 said “A lot less than during the project (up to 60% less).”

5 said “Somewhat less than during the project (up to 30% less).”

7 said “The same amount as during the project (equal to using “one less car”).”

14 said “Somewhat more than during the project (up to 30% more).”

2 said “A lot more than during the project (up to 60% more).”

4 said “The same amount as *before* the project.”

0 said “More than *before* the project (over 100% more).”

Twenty-eight respondents are driving “only somewhat more” - up to 30% more - than during the Non-Driving period (the ones who selected choices 1, 2, 3, and 4). This is a significant reduction in average weekly VMT from the participants' Baseline mileage. And only 4 respondents, or 11%, have fully returned to pre-study levels of driving (the ones who selected choice 6), and, fortunately, none have begun to drive more than their pre-study Baseline level.

Question #4 (on the **2001 survey**) asked participants:

“As compared to **during the portion of the project using “one less car”**, do you feel your household is driving: *(Circle the number that best describes your situation.)*”

1	2	3	4	5	6	7
A lot less than during the project (up to 60% less)	Somewhat less than during the project (up to 30% less)	The same amount as during the project (equal to using “one less car”)	Somewhat more than during the project (up to 30% more)	A lot more than during the project (up to 60% more)	The same amount as <b>before</b> the project	More than <b>before</b> the project (over 100% more)

Nineteen out of twenty-three households in the 2001 round completed this question in the survey. Out of those, **sixteen**, or **84% of respondents**, **indicated they were continuing to drive only up to 30% more than during the Non-Driving Period of the study** even though a total of only five households sold their car.

The **2001 responses** are:

1 said “A lot less than during the project (up to 60% less).”

4 said “Somewhat less than during the project (up to 30% less).”

5 said “The same amount as during the project (equal to using “one less car”).”

6 said “Somewhat more than during the project (up to 30% more).”

1 said “A lot more than during the project (up to 60% more).”

2 said “The same amount as *before* the project.”

0 said “More than *before* the project (over 100% more).”

Sixteen respondents are driving “only somewhat more” - up to 30% more - than during the Non-Driving period (the ones who selected choices 1, 2, 3, and 4). This is a significant reduction in average weekly VMT from the participants' Baseline mileage. And only 2 respondents, or 11%, have fully returned to pre-study levels of driving (the ones who selected choice 6), and, fortunately, none have begun to drive more than their pre-study Baseline level.

Similar to the issue between the Comparison Method vs. Saved Trip Method of evaluating “saved trips” (refer to page 28), we wanted to compare the participant households' perception of their continuing behavior change (as just described) against actual figures of miles driven. For a variety of reasons this has proved not possible.

In both the 2001 and 2002 rounds we found in some cases we could not establish accurate mileage data for the six months following the study. This was because, within the six months following the study, some participants had traded in one (or more) of the cars which they had owned during the study for a different vehicle, and could not provide us a final odometer reading for the replaced car at the time of trade-in, and/or could not provide a starting odometer reading for the replacement vehicle. In other cases some participants did not complete a Follow-Up Survey, despite our repeated efforts at contacting them and reminding them of their contractual obligations. Thus the Follow-Up Surveys we did receive do not have the mileage data for all households, and in the **Report on Results** - especially for the 2002 round - we describe how sensitive some kinds of mileage data is to the behavior of just a couple households (see Figures 3, 4 and 5, for example).

In the 2001 Follow-Up Survey in particular, the questions we asked allowed us to identify both when there was atypical trip behavior in a particular household in the six months following the study and the reasons for it, but not how much atypical mileage may have been generated. In some cases a 2001 participant moved into a new job that required a longer commute, which then drove up their weekly average VMT in spite of significant trip reduction behavior achieved on other non-commute trips during the week. (The questions for the 2002 Follow-Up Survey were refined to allow us to also know how much atypical mileage may have been generated.) Additionally, the Follow-Up Surveys do not capture SOV miles generated by cars other than the ones the household owns - so they do not capture mileage due to Borrowed Cars or Flexcar for example (although one might suppose that these modes would be minimal in a two-car households which now had full use of both cars).

## Benefits Beyond the Study

The chart below shows all the direct benefits of the study in terms of miles reduced and pounds of emissions avoided.

### Benefits Realized Within One Year

<b>Basic info on Study</b>						
	# of HH	# of weeks	Total miles saved	Avg. miles saved per HH /week	# of HHs that sold cars	% of HHs that sold cars
<b>Demo Study I</b>	22	6	8,100	61	3	13.6%
<b>Demo Study II</b>	23	6	7,600	55	9*	33.3%
<b>Demo Study III</b>	41	9	25,763	70	6	14.6%

<b>Weighted average of 3 rounds</b>	
miles saved/HH/ week	62

\* Includes 4 who sold before study began, plus 23 participants in 2001

Total who sold cars	18	20.5%
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### **Method A. Direct benefits of Study**

#### A1. Miles Saved During Study

	Miles Saved	Carbon Dioxide (lbs.)	Carbon Monoxide (lbs.)	Nitrogen oxides (lbs.)	Hydrocarbons (lbs.)
<b>Demo Study I</b>	8,100	6,480	393	27	56
<b>Demo Study II</b>	7,600	6,080	369	25	53
<b>Demo Study III</b>	25,763	20,610	1,250	85	179
<b>Total</b>	<b>41,463</b>	<b>33,170</b>	<b>2,011</b>	<b>137</b>	<b>287</b>

#### A2. Miles Saved from Sale of Cars - for One Year

Every household that sold a car signed an agreement not to replace it for at least one year

# of HHs that sold a car 18

Avg. miles saved/wk by HHs that have 1 less car 62

	Miles Saved	Carbon Dioxide	Carbon Monoxide	Nitrogen oxides	Hydrocarbons
Reduction by these HHs in 1 year	48,426	38,741	2,349	160	336

	Miles Saved	Carbon Dioxide	Carbon Monoxide	Nitrogen oxides	Hydrocarbons
<b>Total reductions by method A1 and A2</b>	<b>89,889</b>	<b>71,911</b>	<b>4,360</b>	<b>297</b>	<b>623</b>

**Benefits Realized After One Year**

The following chart illustrates possible ongoing benefits of the study. The following figures are based on assumptions.

**Method B. Ongoing benefits of Study beyond 1 Year**

*A future study, if funded, could track the ongoing behavior of the households to determine how long the impacts of the study last on the travel behavior of the households.*

*The following figures are based on assumptions. They are presented for illustrative purposes.*

**B1. Ongoing benefits from Study HHs that sold cars**

# of HHs that sold a car after study 18

*Of the HHs that sold a car, if we assume the following behaviors after their 1 year agreement expires:*

HHs that replace car when agreement expires 25%  
 HHs that replace car 5 yrs. after agreement expires 50%  
 HHs that replace car 10 yrs. after agreement expires 25%

Total # of years of One Less Car beyond 1 year agreement 75

	Miles Saved	Carbon Dioxide	Carbon Monoxide	Nitrogen oxides	Hydro-carbons
Reductions over 10 years for these HHs	242,131	193,705	11,744	801	1,678

**B2. Ongoing benefits from Study HHs that did NOT sell cars**

# of HHs that did not sell car after study 71

*If we assume the following:*

% of HHs that make no lasting VMT reductions 25%  
 % of HHs that continue VMT reductions for 1 yr 50%  
 % of HHs that continue VMT reductions for 5 yrs 25%

	Miles Saved	Carbon Dioxide	Carbon Monoxide	Nitrogen oxides	Hydro-carbons
Reductions over 10 years for these HHs	401,130	320,904	19,455	1,327	2,780

	Miles Saved	Carbon Dioxide	Carbon Monoxide	Nitrogen oxides	Hydro-carbons
<b>Total reductions by method B1 and B2</b>	643,261	514,609	31,199	2,127	4,458



## Replicability and Materials Produced

During the three years since the beginning of the **Way to Go, Seattle!** 'One-Less-Car' Demonstration Study, we have had inquiries from over twenty cities about the project seeking to understand how they can start one themselves. In order to help others understand the program and replicate it, we have developed various products and documents, and have created a full-fledged educational package in a CD-Rom format which can be easily distributed. Additionally the complete contents of the CD-Rom is also being made available for download on our website ([www.seattle.gov/waytogo](http://www.seattle.gov/waytogo)). These products are multi-purpose, and benefit our local version of the study as well. The FWHA grant we received allowed us to complete the full-fledged educational package.

The following products and documents are highlights of what has been created, and are available for other municipalities and agencies to use to replicate the project:

1. A participant contract describing terms of participation and outlining the public benefit rationale based on existing conservation practices commonly of interest to State and local governments.
2. A Travel Diary for Baseline and Non-Driving periods which allows participants to effectively record transportation behavior.
3. An Ending Evaluation Questionnaire to capture comments and data beyond the Travel Diaries.
4. A method of quantifying the number of VMT and pounds of CO<sub>2</sub> reduced during the Study period.
5. A Car Cost Worksheet that allows anyone to accurately calculate full costs of car ownership.
6. An Odometer Tracking Sheet that enables participants to verify odometer readings.
7. Fact Sheets for the two study rounds which summarize the major impacts on quality of life issues such as the number of miles not driven and trips not made which reduce neighborhood traffic congestion, and the pounds of pollutants not put into the air.
8. A website that makes information and tools on trip reduction and smart transportation choices accessible to citizens (and others).
9. An overall design for a 'One-Less-Car' Study which allows specific information about trip reduction behavior and transportation choices to be gathered, analyzed, and applied to strategic transportation policy decisions and public education efforts.
10. Reports providing analyses, results, and refinements of such a study.

## Plans for the Future

### Further Questions for Study

The One Less Car Study has provided useful insight into household driving habits and how education and car availability affects transportation choices. This study is an excellent first step into researching this question. The study also raises a number of additional questions that warrant further study. Below are some of these questions.

- How representative of Seattle as a whole were the households that took part in the study? In other words, to what percentage of Seattle households, can we apply the results of the study?
- Which Seattle demographic groups would reduce their driving / sell a car more if they are provided with transportation information and reduce the number of cars in their household? Will some Seattle demographic groups reduce their driving less, given the same circumstances? Demographics to examine may include:
  - Income
  - Number of car in household
  - Number of drivers in household
  - Age of cars
  - Age of drivers
  - Neighborhoods / neighborhood services within walking distance
  - Transit access
  - Commute distance
- What elements of the study (or combination thereof) had the most impact on the reduction of driving / sale of a car – information on transportation options, experience of having one less car, the stipend, incentives to sell the car, information on the cost of owning and operating a car? What other elements might be added to the experience to increase the impact?
- What combination of elements have the most impact on which demographic groups? These questions will help focus future efforts on the most responsive target groups.
- Some households in the study actually drove more miles with one less car. Why did some household drive more when most households drove less?
- After the going through the experience of the study, what factors are needed to encourage a household to sell a car? For example, what role do incentives play? Do they merely speed up a decision that has already been made by the education of the experience of living with one less car? Are the incentives important because they act as a necessary catalyst for household to act on that knowledge and actually sell the car?
- What are the long-term impacts of the study? Do people continue to drive less and/or own fewer vehicles, or do they revert back to older behaviors? What changes can be made to lengthen the behavior changes or make them permanent?

### **One Less Car Challenge**

The “One-Less-Car” Study has demonstrated that owning fewer cars significantly reduces miles driven, reduces pollution and saves money. The success of the study provides a platform for the City of Seattle to launch the “One Less Car Challenge”. Most of the components of the Challenge are the same as the Study, with the notable exception that participants are not required to provide trip data and participants do not receive a stipend.

The “One Less Car Challenge” is designed as a mobility program to increase walking, biking and busing by empowering citizens to make conscious decisions about their travel choices. Just as in the “One-Less-Car” Study, participants will receive information on biking, transit, carpooling, Flexcar, etc., and participants will learn that owning fewer cars reduces stress and saves money. Instead of receiving a stipend, participants will receive incentives such as ten free hours of Flexcar (car-sharing) use during each month of their participation. They will also receive encouragement through the knowledge that they are part of a citywide movement to make the community better.

The program will be announced in August of 2003, and the first month of participation will be September 2003. Participants will sign up for sessions lasting one month – a period of time program staff believe will not be so daunting that it would discourage potential participants. However, during the program, participants will be encouraged to continue for a second or even a third month to solidify their new travel habits. Participants who sell their car will receive ten hours of free Flexcar use per month for one year and an annual bus pass provided through a joint agreement between the City of Seattle and Metro, the King County transit agency.

### **Transportation Conservation Public Education Campaign**

The “One-Less-Car” Study provides a foundation for a new citywide program and an entire public education campaign to encourage citizens to drive less. The “One Less Car Challenge” is the first step in a citywide “Transportation Conservation” campaign. The inspiration for such a campaign is Seattle’s past success in leading the nation in reducing waste and saving money through recycling, water conservation, and energy conservation.

The City has established the goal of directly reducing over one million miles of car driving over the next few years of the “One Less Car Challenge” and “Transportation Conservation” public education campaign.

Our transportation network has an upper limit of how many vehicles it can carry per hour. Reducing the vehicle demand on the network’s capacity by reducing the number of trips made by cars – especially SOV trips – is what Transportation Demand Management (TDM) is all about. TDM takes only weeks or months to achieve measurable results in reduced trips, compared to the years it takes to reap the benefits of capital projects.

TDM efforts frequently work to educate people to make both smarter and more conscious transportation choices (i.e. make strategic use of the full range of travel modes available to them rather than habitually using their car for every trip). A “Transportation Conservation” effort can increase the capacity of the transportation system without incurring additional capital costs and by minimizing maintenance costs. Our investment in reducing traffic will be paid back many times over in greater mobility and better management of our existing transportation system. It will also reap other community benefits such as economic development, enhanced public health, and stronger communities as more people bike, walk and take the bus.

The campaign may include the following components:

1. **Public education** - in the form of earned and paid media showing how it is possible to be part of the transportation solution while maintaining your mobility and saving household money on car expenses.
2. **Incentives to drive less** - Public and private partners will be sought to leverage funding for the program. Partners could provide incentives such as discounts in Seattle's Flexcar car-sharing program, exchange deals such as "trade-in two used cars and get one new hybrid electric car," coupons from local businesses to encourage walking and biking, and other incentives to try new modes of transportation
3. **Experiencing mobility without that car** - Experience from the "One-Less-Car" Study shows that many people may want to give up a car but are not confident that they can survive comfortably without it. This component addresses that issue by simulating living without that car while arming participants with the tools to achieve mobility with fewer cars:
  - **Seattle "One Less Car" Challenge** - This program will challenge the entire community with an inspiring goal of reducing VMT. Additional funding for the Challenge will expand it beyond its original Fall 2003 scope by allowing more promotion and more tools, such as providing off-site storage for cars and establishing a hassle-free method for participants to sell their car.
  - **Individualized marketing** - Programs in cities such as Perth, Australia, have reduced drive-alone trips by over 14% - simply by directly providing citizens with information on their specific transportation alternatives. Locally, Portland, Oregon launched the first U.S. pilot program of this kind in 2002. This cost-effective, proven approach is an efficient and cost-effective use of existing transportation modes.
  - **Neighborhood transportation captains** - would serve neighborhoods in a structure similar to the successful Block Watch crime prevention program. Citizens would be trained to provide a convenient source of information for their neighbors to learn the specific transportation options available in their own neighborhood. The City has funded a grant for a 2003 test of such a program.

If we are successful in receiving grant funding for the expanded campaign, it will also allow us to further study the questions raised and build on the results from the One Less Car studies completed in 200-2002.

## Final Thoughts

If every one of the 253,437 households<sup>19</sup> in Seattle did what the eighty-six 'One-Less-Car' Demonstration Study households did, nearly 16 million miles of automobile traffic would be kept out of our neighborhoods and 7,160 tons of carbon dioxide and 357 tons of other pollutants would be kept out of our air each week. While living with 'one-less-car' may not be practical for all Seattleites, the Demonstration Study has shown convincing evidence that it is doable for many.

The study shows that when given accurate information about costs of various transportation modes, combined with sufficient availability multi-modal choices in a transportation network and a little push to experiment with their transportation choices, many people will modify their behavior to realize economic savings due to reduced car ownership. Given the fact that no city, county, or region can ever build enough transportation infrastructure to eliminate automobile-related congestion, the lessons provided by the Demonstration Study points to a doable alternate means of achieving acceptable mobility by reducing demand, and doing so at dramatically less cost than increasing capacity.

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<sup>19</sup> 2000 Census figure.

