

# An Investigation into Constraints to Sustainable Vehicle Ownership: A Focus Group Study



MTI Report 10-08



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**AN INVESTIGATION INTO CONSTRAINTS TO  
SUSTAINABLE VEHICLE OWNERSHIP: A FOCUS  
GROUP STUDY**

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March 2011

A publication of

**Mineta Transportation Institute**

Created by Congress in 1991

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# TECHNICAL REPORT DOCUMENTATION PAGE

<b>1. Report No.</b> CA-MTI-11-2903	<b>2. Government Accession No.</b>	<b>3. Recipients Catalog No.</b>	
<b>4. Title and Subtitle</b> An Investigation into Constraints to Sustainable Vehicle Ownership: A Focus Group Study		<b>5. Report Date</b> March 2011	
		<b>6. Performing Organization Code</b>	
<b>7. Authors</b> Bradley Flamm, PhD and Asha Weinstein Agrawal, PhD		<b>8. Performing Organization Report No.</b> MTI Report 10-08	
<b>9. Performing Organization Name and Address</b> Mineta Transportation Institute College of Business San José State University San Jose, CA 95192-0219		<b>10. Work Unit No.</b>	
		<b>11. Contract or Grant No.</b> DTRT07-G-0054	
<b>12. Sponsoring Agency Name and Address</b>  California Department of Transportation Sacramento, CA 94273-0001 <span style="margin-left: 150px;">U.S. Department of Transportation Research and Innovative Technology Administration (RITA) Office of University Programs 1200 New Jersey Avenue, SE Washington, DC 20590</span>		<b>13. Type of Report and Period Covered</b> Final Report	
		<b>14. Sponsoring Agency Code</b>	
<b>15. Supplementary Notes</b>			
<b>16. Abstract</b>  <p>Though most Americans hold pro-environmental attitudes, an attitudes-behavior gap exists with respect to vehicle ownership. Significant constraints appear to prevent most people with environmental concerns from buying smaller, more fuel-efficient, less-polluting vehicles. But researchers have only a simplistic understanding of what those constraints are and how individuals describe and react to them. This study explored these barriers in depth through a series of focus group discussions with 36 residents of the Sacramento, California, metropolitan region who held pro-environmental attitudes.</p> <p>Analysis of the focus group conversations revealed that the features of vehicles currently on the market, family and work responsibilities, residential choices, and routines and preferences all constrained participants' vehicle purchase choices to ones which, more often than not, poorly reflect their environmental attitudes. The group conversations also revealed serious misunderstandings about the environmental impacts of owning and using vehicles that make it difficult for many to accurately assess their alternatives.</p> <p>For some participants, environmental concerns are unlikely to influence future vehicle purchase decisions, even if constraints were removed altogether; other priorities have taken and will take precedence over the environmental impacts of their choices. But for many participants, strategies to remove or weaken the identified constraints to owning smaller and more fuel-efficient vehicles could lead them to choose vehicles that would reduce their resource and energy consumption for personal transportation. Further research with a larger pool of subjects is needed to confirm whether the focus group findings apply to the larger population.</p>			
<b>17. Key Words</b> Constraints; Environmental attitudes; Environmental knowledge; Vehicle ownership		<b>18. Distribution Statement</b> No restrictions. This document is available to the public through The National Technical Information Service, Springfield, VA 22161	
<b>19. Security Classif. (of this report)</b> Unclassified	<b>20. Security Classifi. (of this page)</b> Unclassified	<b>21. No. of Pages</b> 64	<b>22. Price</b> \$15.00

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Library of Congress Catalog Card Number  
2009943696

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## **ACKNOWLEDGMENTS**

We offer our sincere thanks to research assistant Kanhong Lin; Pat Costanza and her staff at TMD Group, Inc., who managed the focus groups; and David Ford of Temple University's Social Sciences Data Library.

The authors would like to thank MTI staff, including Research Director Karen Philbrick, PhD; Director of Communications and Special Projects Donna Maurillo; Research Support Manager Meg A. Fitts; Student Publications Assistant Sahil Rahimi; Student Research Support Assistant Joey Mercado; Student Graphic Artist JP Flores; and Webmaster Frances Cherman. Additional editorial and publication support was provided by Editorial Associate Cathy Frazier.

## Acknowledgments

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## EXECUTIVE SUMMARY

Despite widespread pro-environment sentiments among Americans, a gap persists between their attitudes and their behavior when it comes to buying cars and light duty trucks for their private use. Individuals appear to face significant objective and perceived constraints that make it difficult for them to align their vehicle purchases with their environmental attitudes.

This study explores that attitudes-behavior gap through analysis of comments made during a series of four focus group conversations held in the Sacramento, California metropolitan region in the fall of 2009. The group conversations were designed to address three key questions:

1. To what extent do people perceive that their vehicle ownership reflects their environmental attitudes?
2. What barriers and constraints do people perceive to aligning their environmental attitudes with their vehicle ownership choices?
3. What changes in personal circumstances and travel options do people believe would permit them to bring their vehicle ownership more closely in line with their environmental attitudes?

The gap between people's pro-environmental attitudes and choices about transportation is an important one for researchers and policy-makers because of the extensive environmental impacts of owning vehicles that could be mitigated if consumers were to choose smaller and more energy-efficient vehicles.

Through comments made by the 36 participants, the attitudes-behavior gap was revealed to be a real one with important consequences. Even among a group of participants selected for pro-environmental attitudes, barely one in ten considered the impact on the natural environment of their most recent vehicle purchase. For the rest, other vehicle purchase factors—cost, safety, comfort, aesthetic and functional preferences—proved to be so much more important that environmental impacts were never directly considered. *Indirectly*, energy efficiency was a concern to about half of the participants, but only because better mileage represented desired cost savings.

This gap between their concern for protecting the natural environment and their actual choices in buying a vehicle created a sense of discomfort in many of the participants and regret that, *if only* specific constraints did not prevent them from choosing more environmentally friendly vehicles, they might have selected their most recent car or light duty truck differently.

The constraints to buying smaller, more fuel-efficient vehicles were numerous: sustainable vehicles<sup>1</sup> are too expensive, they do not offer needed or desired features, the technology is unfamiliar, and the infrastructure does not exist to support alternative fuels. What is more, alternatives to driving are inconvenient and insufficient to their needs, personal habits prevent them from changing behavior, and the scale of environmental problems renders their efforts meaningless and ineffective. In short, the vehicles on the market, their family and work responsibilities, their residential choices, and their routines and preferences all

constrained most participants' vehicle purchase choices to ones which poorly reflected their environmental attitudes.

Participants have also been constrained in their choices by misinformation and uncertainty about the environmental impacts of owning cars and light duty trucks. Most participants believe their vehicles affect the natural environment negatively, but they were uncertain as to what the impacts are and how these relate to vehicle ownership. Many were unable to accurately compare the impacts of owning cars to other behaviors (like using power lawnmowers or using plastic shopping bags) or misunderstood the differences between air pollutants and greenhouse gas emissions. Such misconceptions prevent people from making well informed, accurate decisions about the relative environmental impacts of vehicles on the market.

Many participants said that if sustainable vehicles were less expensive, if the newer, more fuel efficient technologies were considered more reliable and tested, or if they perceived that their actions would have a positive effect on the natural environment, then they would buy a more sustainable vehicle the next time. About half of them, when presented with a hypothetical, money-is-no-object scenario, indicated they would buy a hybrid-electric version of a car or light duty truck they already owned, or an alternatively fueled vehicle.

The key conclusion from these focus group sessions is that pro-environmental concerns were only very rarely important during the process of buying a new or used vehicle and that there is mixed evidence on the potential for environmental attitudes to significantly influence vehicle-buying and use patterns. For some participants, the relationship between vehicles and the natural environment is one that is unlikely to be a high priority under any circumstances; other factors have taken precedence in their vehicle buying patterns (e.g., safety concerns, desires for comfort and power, and an emphasis on reliability) and, they acknowledged, likely will continue to do so. Still, providing buyers with more accurate information about the environmental impacts of vehicles during the purchasing process could have influenced some participants' choices and would in future be a useful, if not sufficient, strategy for linking environmental attitudes and vehicle ownership decisions more closely.

Further research is needed to test whether the results from this qualitative research project hold true for larger populations. If they do, developing public information and social marketing strategies to correct the misconceptions and encourage consideration of the environmental impacts of vehicle choices has the potential to help U.S. consumers transition to a more sustainable fleet of private vehicles.

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## INTRODUCTION

Many Americans find it difficult to reconcile their desires to reduce their impacts on the natural environment with the transportation options that are available to them. Indeed, even the most pro-environment individuals face objective and perceived constraints that make it difficult for them to align their attitudes with their transportation choices. This study explores that attitudes-behavior gap as it relates to decisions about vehicle purchase, using analysis of comments made during a series of four focus group conversations held in the Sacramento, California metropolitan region in the fall of 2009.

The focus group conversations were designed to address three questions related to the attitudes-behavior gap surrounding vehicle ownership decisions:

1. To what extent do people perceive that their vehicle ownership reflects their environmental attitudes?
2. What barriers and constraints do people perceive to aligning their environmental attitudes with their vehicle ownership choices?
3. What changes in personal circumstances and travel options do people believe would permit them to bring their vehicle ownership more closely in line with their environmental attitudes?

The gap between people's pro-environmental attitudes and choices about transportation is a critical one for researchers and policy-makers to address because the environmental impacts of owning vehicles are enormous. Though new cars and light duty trucks use advanced pollution control technologies and are far cleaner today than they were several decades ago, the increasing use of private vehicles has negated many of the potential benefits of the new technologies. In contrast to the significant personal benefits enjoyed by vehicle owners, cars and light duty trucks have substantial social costs associated with their use. Despite technological improvements, they remain a significant source of air and water pollutant emissions; their use negatively affects community livability through traffic congestion, collisions with other vehicles, bicyclists, and pedestrians, and noise pollution; both road infrastructure and vehicle use contribute to habitat fragmentation and endanger threatened species; and they are one of the largest sources of greenhouse gas emissions in the world.<sup>2</sup>

Given that a consistent majority of respondents to national polls for the past three decades have expressed pro-environment attitudes,<sup>3</sup> there is clearly a large group of people who might be willing to modify their travel behavior to act more sustainably—if they could overcome the constraints they face. This study is designed to help the transportation community identify programs and policy actions that would allow more people to act in a sustainable fashion when it comes to making choices about their vehicle ownership. The findings of the focus groups include detailed assessments of the extent to which participants feel their travel behavior reflects their environmental attitudes, as well as detailed descriptions of the significant actual or perceived constraints that the participants believe prevent them from making more sustainable choices about their vehicle ownership. These findings from this small, qualitative study need to be confirmed through quantitative research with a larger sample size to confirm whether the results hold with the general population. Assuming they do, the findings suggest

various policies that could help reduce the gap between pro-environmental attitudes and vehicle ownership.

The remainder of the report is organized into four chapters. The first is a review of the literature on the linkages between environmental attitudes and vehicle ownership. The next two chapters describe the study methodology and present detailed findings from the focus groups. The concluding chapter discusses policy implications suggested by the findings, as well as suggestions for further research.



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## LITERATURE REVIEW

Understanding the factors that influence vehicle ownership and use has received considerable research attention from planners, economists, and marketing specialists. The vehicle purchase process is complex, with consumers typically considering multiple decision criteria. Traditional models of car buying behaviors are based on utility functions in which preferences, knowledge of alternatives, and resource constraints yield estimates of vehicle type choices for individuals and groups. Socio-economic and demographic variables (such as income, educational attainment, residential location, age, gender, and household size) are used to create predictive models of likely vehicle type choices, as are stated and revealed preferences for vehicle attributes such as safety features, fuel efficiency, resale value, expected maintenance costs, engine size, and amenities such as air conditioning, sound systems, and power steering.

Numerous statistical approaches, such as logit and disaggregate choice models, have used these preferences and characteristics to predict vehicle choices.<sup>4</sup> The results have permitted researchers to develop future vehicle fleet estimations for transportation, traffic management, infrastructure, and environmental planning purposes, as well as helping marketers to make vehicle production recommendations.

Attitudinal factors—individuals' perceptions and preferences concerning attributes and uses of personal vehicles—are a more recent addition to the modeler's toolkit that have broadened the models' use and improved their utility.<sup>5</sup> Widely used to address the attitudes-behavior relationship is Icek Ajzen's theory of planned behavior,<sup>6</sup> which argues that attitudes toward a given behavior, subjective norms about that behavior (or the social expectations of individuals concerning the behavior), and perceived level of control over the behavior all contribute to behavioral intentions. Those behavioral intentions combine with an individual's perceptions of control to produce the actual behavior. While Ajzen's model isn't commonly used in travel behavior research, there have been some studies that have employed the theory of planned behavior to explain mode choice, safety practices, pedestrian, and other transportation-related behaviors.<sup>7</sup>

As environmentalism has become a more prominent feature of American social and political life, researchers have included environmental attitudes in vehicle choice and use models as an important predictor of individuals' and households' behavior.<sup>8</sup> In pursuing this line of inquiry, however, researchers have found that many Americans, even those who profess pro-environmental attitudes, fail to act on those attitudes when buying vehicles. Consumers find it difficult to reconcile their attitudes toward the natural environment with the vehicle and transportation options that are available to them. Although there can be a significant relationship between individuals' environmental attitudes and their travel behavior,<sup>9</sup> the effect of environmental attitudes on vehicle ownership, as well as on mode choice and vehicle miles traveled, is often small. Researchers commonly refer to this disconnect as attitudes-behavior inconsistency or the attitudes-behavior gap.<sup>10</sup>

Other factors have been studied by researchers seeking to understand attitudes-behavior linkages. Habits, for one, have been demonstrated to affect travel behavior. For example,

many travelers always use a specific mode of travel or habitually follow an unvarying route to their destination.<sup>11</sup> Another factor that researchers have identified as influential is the feeling of efficacy, or the sense of control over the impacts of one's actions.<sup>12</sup> More importantly, constraints, whether objectively present or simply perceived to exist, have been found to affect individuals' decisions about environmentally responsible behaviors such as recycling and commute mode choice. These are all, therefore, important variables to consider.<sup>13</sup>

These multiple factors that have been incorporated in statistical models predicting vehicle ownership choices have broadened the understanding of the complexity of such decisions, but the models can often oversimplify and misrepresent the decision-making process by focusing on quantitative measurement of multifaceted social phenomena. Consequently, a growing number of researchers are turning to qualitative analysis in order to provide richer, more detailed descriptions and understanding of vehicle ownership, as well as vehicle use and other travel behaviors.<sup>14</sup> This study contributes to the latter literature by using focus group discussions to provide fuller understanding of the issues that influence a small number of people's vehicle ownership decisions. While statistical validity is not a characteristic of such studies, the richness and complexity of explanations provide an invaluable addition to the validity of well-designed quantitative analyses.

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## STUDY METHODOLOGY

The authors organized a series of four focus group sessions with residents of the Sacramento metropolitan region to investigate their attitudes, knowledge, and behaviors related to the environmental impacts of their vehicle ownership choices. Focus group research projects typically include between two and six focus groups. The decision was made to conduct four group discussions for this project to be consistent with good practice standards.<sup>15</sup> The project team worked with TMD Group, a professional focus group facilitation consulting firm from Sacramento, California, to recruit participants, create the semi-structured focus group discussion guide, and run the focus groups.

As with any focus group research, the study results are not generalizable to the population at large since only a small number of participants were involved in the conversations. Nevertheless, the findings provide detailed information that builds upon quantitative analysis that has established the significance of the relationship between environmental attitudes and vehicle ownership. By providing a forum in which the participants could discuss the many factors that contributed to their vehicle purchases, we were able to identify attitudes and beliefs that would not have been foreseeable otherwise. Future research can confirm whether the findings from this study hold true with the larger U.S. population.

### DEVELOPING THE FOCUS GROUP GUIDE

The focus groups were primarily designed to address three research questions:

1. To what extent do people perceive that their vehicle ownership reflects their environmental attitudes?
2. What barriers and constraints do people perceive to aligning their environmental attitudes with their vehicle ownership choices?
3. What changes in personal circumstances and travel options do people believe would permit them to bring their vehicle ownership more closely in line with their environmental attitudes?

The focus group guide developed for the moderator was designed to be used in a semi-structured way. Though participants' comments could, and did, result in rearranging the order of topics covered, each session included questions and prompts designed to address five topics:

1. The vehicle purchase decision-making process,
2. The extent to which participants' environmental attitudes played a role in their most recent vehicle purchase,
3. Participants' understanding of the environmental impacts of owning personal vehicles,
4. How participants describe their personal vehicles in terms of "environmental friendliness," and
5. How well participants perceive a correspondence between their environmental attitudes and their vehicle choice.

Appendix A presents the specific questions included in the focus group facilitator's guide.<sup>16</sup>

## **THE STUDY LOCATION: SACRAMENTO, CALIFORNIA**

The focus groups participants were selected from residents living within a set of 50 census block groups located in the six-county Sacramento Area Council of Governments planning area. These block groups were identified in a related research project that used a proportional stratified random sampling process to ensure representation of households with low, medium, and high levels of vehicle ownership.<sup>17</sup> Recruiting the focus group participants from this set of census block groups ensured a broad representation of vehicle use patterns.

The Sacramento, California metropolitan region was selected as the study area because it is representative of communities where a large majority of Americans live—and drive. The region has a growing and demographically diverse population, and there are neighborhoods that reflect typical urban, suburban, and rural land-use patterns found across the United States. Overall population densities are fairly low, however, and most residents rely on automobiles for their daily local travel.

## **PARTICIPANT RECRUITMENT**

TMD Group recruited participants by calling randomly selected phone numbers from a list of all residents living in the 50 census blocks previously described.<sup>18</sup> To identify participants with pro-environment leanings, TMD Group employees screened to select only people who agreed with the statement, “We must protect the environment, even if it means paying higher prices for gasoline and electricity.” Having a general pro-environmental attitude was critical to the research design, so that participants in the focus groups had the potential for an inconsistency between their feelings of concern for the natural environment and their vehicle ownership and use choices.<sup>19</sup>

Participants were also screened to recruit roughly even numbers of men and women and to exclude anyone who worked for San José State University, in marketing, or in an industry directly related to the content of the focus groups, such as car manufacturing or sales, or environmental protection. (See Appendix B for the telephone screening script.)

For each focus group, twelve participants were recruited, assuming that between eight and twelve people would actually attend each session.

## **THE FOCUS GROUP SESSIONS**

The focus groups were held at a modern focus group facility in downtown Sacramento where the sessions were both audio and video recorded. A professional focus group facilitator and an assistant managed each session, while the researchers observed the sessions from behind a one-way mirror.<sup>20</sup> Participants completed a short survey at the beginning of the focus group sessions. This survey took about five minutes to complete and asked for simple socio-demographic information as well as basic information about the vehicles available to the household and the number of miles the participant drives annually. (See Appendix C for the complete questionnaire.) Then, the moderator led participants through a discussion that lasted from 90 to 120 minutes, depending on the specific session.

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## DATA ANALYSIS

The recorded focus group discussions were transcribed from the audio recordings, and all names were replaced with pseudonyms. The researchers then followed a mostly deductive process to develop analysis codes, assessing the transcripts to see what patterns stood out and then developing a set of codes that linked those issues with the study research questions. The transcripts were ultimately coded for analysis using 21 codes that fell into five thematic families:

1. Vehicle ownership decision factors
2. Environmental beliefs
3. Environmental concerns
4. Environmental actions, both actual and potential
5. Attitudes-behavior consistency

Appendix D presents the specific definitions used to guide the coding process. The coding was completed using Atlas.ti data analysis software.

## THE PARTICIPANTS

Participants in the four focus groups sessions convened in November 2009 were a relatively diverse group, with one exception: they had been screened for pro-environmental attitudes based upon a simple question widely used by pollsters and survey-takers for the past several decades. By agreeing with the statement “We must protect the environment, even if it means paying higher prices for gasoline and electricity,” the participants did not particularly distinguish themselves as unusual. In most polls over half of Americans (and in California, up to two-thirds of respondents) answer in the same way.<sup>21</sup>

Thirty-six individuals participated in the four focus group sessions, with the attendance ranging from eleven in the first session to six in the final session. Twenty-two of the participants were male and fourteen female. The average age was 43; four were younger than 30, nine were over 50, and the rest were evenly split between their 30s and 40s. Most participants described themselves as Caucasian (27 of 36), six as African American, two as Asian, and one as Hispanic. Eight participants had a high school degree as their highest level of education, twelve had attended some college courses, another dozen had college undergraduate degrees, and four had graduate degrees. The average household size of the participants was three people with a median size of two. Six participants lived in single-person households. Table 1 presents a summary of the participants’ socio-demographic and travel behavior characteristics.

The average household owned 2.14 vehicles, and the average vehicle ownership per household adult member was 0.97 vehicles. The households of 11 participants owned fewer than one vehicle per adult, 19 owned exactly one vehicle per adult, and six owned more than one vehicle per adult. The vast majority of vehicles owned by participants were passenger cars, some of which had high fuel efficiency (such as a Geo Metro and a Honda Civic). About a third of the participants owned a light duty truck, most of these small pickups, though several participants owned large, fuel-inefficient vehicles such as a Chevrolet Suburban.

**Table 1. Focus Group Participants' Socio-Demographic and Travel Behavior Characteristics (n=36)**

<b>Personal Characteristics</b>	<b>No. of Participants</b>	<b>Personal Characteristics</b>	<b>No. of Participants</b>
Age (years)		Miles driven per year	
18–29	4	< 3,000/year	6
30–39	11	3,001 to 7,500/year	12
40–49	14	7,501 to 12,500/year	9
50–59	6	> 12,501/year	7
60+	3	NA	2
Race/ethnicity		Travel patterns in past 7 days	
White	27	Transit (for any purpose)	9
Black or African-American	6	Walk/bike (for any purpose)	21
Asian	2	Commute mode (past 7 days)	
Hispanic or Latino origin	1	Drive alone	18
Other	0	Carpool	5
Educational attainment		Public transit	2
High school graduate	8	Bicycle	4
Some college	12	Walk	3
College graduate	12		
Post graduate	4		
Employment status		<b>Household Characteristics</b>	
Employed	26	Average size	2.9 people
Unemployed	5	Average number of vehicles	2.1 vehicles
Retired	4		

*Note:* For some variables the numbers do not sum to 36 because some participants declined to answer the question.

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## FINDINGS

This chapter discusses the common themes that emerged from the focus groups. The first section describes the vehicle purchase process and how environmental factors did—or did not—play into it. The following section discusses the participants’ knowledge of the impacts of owning vehicles on the natural environment: in general, they knew that there *is* an impact, particularly on climate change caused by greenhouse gas emissions from burning fossil fuels in vehicle engines, but they were unclear on the details and they often were misinformed or misunderstood some aspects of the impacts. The final section addresses the participants’ comments about the constraints that they perceived prevent them from aligning their vehicle purchase choices with their environmental attitudes. Many of the key constraints cited were linked to the belief that only hybrid vehicles are pro-environmental choices. Among the constraints described were that sustainable vehicles are too expensive, they do not provide needed amenities, and they rely on unproven technologies. Other constraints included the belief that one can compensate for a less sustainable vehicle choice through other pro-environment actions and the sense that an individual’s actions are irrelevant because one person cannot have an impact on global crises like global warming.

### THE VEHICLE PURCHASE DECISION-MAKING PROCESS

To understand the role of environmental attitudes in vehicle ownership, the research team designed the focus group sessions to first explore the decision-making process for buying cars and light-duty trucks. The focus group facilitator started each session with a simple question asking participants what factors most influenced them when choosing the vehicle they bought most recently.

#### Key Factors Considered

More often than any other factor, participants identified reliability (which some participants expressed using the words “dependability” and “durability”) of the car they bought as a key feature. Susi, for example, explained:

You know... I’ve had hand me downs. I’ve had... I’ve driven a lot of stuff. So to me... I’m not finicky about, um... any of that. I just want to make sure it doesn’t break down, and that I, you know, when I, um... when my son was littler I needed to be able to get to daycare and need to be able to get to work. And so, cupholders... you know? AC is a plus [does a thumbs up], definitely here. Hooo... I don’t know if I could live without it. But, um... yea, color? None of that. You know, you just... it’s just gotta be a good car.

Brett echoed this preference:

She [his wife] got the last one, so, I was like, next in line. I got an old truck that’s over ten years old. So, it was kind of like my turn. And... and I wanted a car that was dependable and... and we bought it brand new. I wanted, you know, I didn’t want it to break down and stuff.

Safety was another factor important to large numbers of participants. More than half cited safety as a very high priority. For example, Samuel and Zoe had this exchange:

Samuel: Among the top [factors in the vehicle buying decision], I think the one that I could select the best is survivability of the occupants during a crash.

Zoe: And I can relate to that because I was hit in my Hyundai Santa Fe at a... and I was at a stop and this girl on a cell phone hit me doing about 43 miles per hour and sandwiched me with four cars ahead of me. And the damage was sixteen thousand dollars to this vehicle that I only owed eighteen on. And, so I walked away from that... whereas other makes of cars that kind of an impact could have, you know, needed the jaws of life.

Another participant, Simon, explained that:

We're a young couple and I know that I wanted something at least safe and dependable because we're expecting children in the next couple years.

Concerns about safety influenced the specific type of vehicle to buy and led some participants to avoid smaller vehicles that they perceived as inherently unsafe. For example, Fred said:

I don't... I don't want... if there was an accident. I mean I've been in a few accidents on a bicycle, but more or less if I'm in a vehicle, I want to be really protected. And a truck... I would feel more... I would feel safer.

Economic value was important enough to about a third of the participants for them to mention. Marnie, for example, said that, "Yes, I had to see, you know... the cars and see the money, see how much we want to spend. [quietly] It's expensive. Similarly, Wayne said:

Second thing I look at is longevity and the price. How long will this car last me? And how much money am I paying for this car? And if everything adds up and it makes sense, then I'll purchase the car.

A majority of participants also mentioned high fuel efficiency as a priority factor in the vehicle purchase decision. However, all but one participant linked its importance to the cost of driving, not to environmental impacts. Tonya, for example, responded to the question "What is the most important thing that you're looking for?" by saying: "Right now it's gas mileage, with the price of gas." In another exchange, the facilitator asked Rachel why, specifically, she was looking for fuel efficiency, and she responded, "Um... because I think it's, uh... it's better if you travel a lot. It gets very expensive with the gasoline."

Fred, however, was one of a few participants who, upon prodding, linked fuel efficiency to environmental impacts. He began by saying, "It was pretty much the gas mileage. I just put a few bucks in it and it goes and goes and goes." But when asked later in the conversation if environmental concerns affected his vehicle choice, he said, "The gas mileage is pretty much the main issue, um...it's not something that's going to pollute the environment. So, you know... smaller engine."



Other factors mentioned as important by smaller numbers of participants included comfort for the driver and passengers, functional features, and aesthetic preferences. Some individuals wanted specific functional features in a vehicle, such as a large cargo area, an engine large enough to tow a motor home, and large seats for big drivers. Susi, for example, said, “My husband’s a big guy. You know, he’s 6’2”, 250. So you know, we’re not going to buy a little car. You know, that’s a no brainer!” And Hannah said: “If I were to buy a car in the future, I would make sure it has an iPod adapter jack. My current car doesn’t have it.”

A variety of features that reflected individual preferences were mentioned—one person wanted a convertible top, another was looking for a specific color or make of car, yet another wanted bucket or leather seats, and so on.

### **The Role of Environmental Attitudes**

When participants discussed the criteria they used to choose a vehicle, not one specifically mentioned the environmental impacts of their choice as a factor. It was clear from their recounting of the car buying process that most participants very rarely think about the environmental impacts of vehicle ownership and use. This position was explained clearly by Melanie:

I don’t even think I think about it [the environmental impact of her vehicle]. I do not even think about it. I go to work and come home. I drive a lot because I work out in Elk Grove. If I had my fantasy world, I would ride a mule to work. It would be just down the road, I’d hop on a mule. You know? Go five miles. I’m not going Amish anytime soon, but... [the facilitator and Zoe laugh] I don’t know what that mule’s carbon footprint is. But, I can tell ya, I think of myself as a fairly average American. And I do a little bit of recycling but I don’t think about it. I have got so many other things I’m thinking about first. Like these water bottles, people complain about these. I buy ‘em! I don’t even think about it. So I’m one of those people that are just out there that have just been so consumed with career and children and family. I don’t think about the environment as much other than when people say we should help preserve it. Yeah! I agree. But, I don’t believe I even know how to begin.

After the opening discussion of the vehicle-purchase process, the facilitator pursued the role of environmental concerns in the vehicle buying process by specifically asking participants whether the environmental impacts of cars and trucks played any role in the decision. A few participants admitted that the answer was essentially “no.” Keisha said:

Uh, for me honestly, it was just passing the smog. Is it going to pass smog as far as the environment goes...? I mean I would’ve loved to have gotten one of those hybrids uh... cars but I just wasn’t able to do that. But... as long as it passes smog, it was good enough for me.

And Allie said:

Umm... when I was going to buy a sports car two, three years ago. I didn't consider environmental issues at all. 'Cause I knew I wasn't going to be able to get something like that with a sports car.

Samuel considered the question and first responded by comparing the recyclability of older vehicles to newer ones:

Um, your older cars were... were so much steel that almost the entire... steel or aluminum, could almost be completely recycled. These new cars are so crappy with all the plastic and crap inside that I doubt that you could recycle 100 percent of that car as you could with a classic car. Uh, with so much material has to be just landfilled because you can't recycle it. It's not recyclable at all. And so... I... that being said, I think the older cars have a... have less of an environmental impact than a newer car does.

But when pressed to state unequivocally that environmental concerns were a consideration at the time of his last vehicle purchase, he admitted that it had not been:

Facilitator: Did that influence your buying decision?

Samuel: No! But it's just the discussion brought that up. [people laugh] The discussion brought that up but it did not influence my decision.

Just four participants stated that environmental concerns *did* affect their car choices. One of these was Issa, who said that he chose a four-cylinder Toyota Camry over a six-cylinder version of the same car because it was the more environmentally responsible choice:

That's why I bought the *second* best available for the environment [he considered the greenest vehicle to be a hybrid-electric vehicle]; it was the zero emissions car. So I bought it, even though I wanted the six cylinder. I bought the four.

(Note that he mistakenly believed that his Camry was a "zero emissions" vehicle, perhaps confused by California's stringent SULEV-II [Super Ultra Low Emissions Vehicle] standard.)

Another participant, Amy, said she opted for a gasoline-engine Mercedes rather than a diesel for environmental reasons:

I think for me I really wanted an *older* Mercedes, like a diesel. But then I learned about how bad they are for the environment versus, um... just regular gasoline. And so, I decided to not go with that decision and get a newer one. But, um... that definitely came into my decision making because initially I just wanted to go for an older, um... more classic car.

And Harold and Marissa opted for smaller cars rather than larger vehicles. Given his vehicle preferences, Harold felt that buying a 2002 Saturn SE was the more environmentally responsible choice:

Well I decided to get... I... uh... Environmental issues are a concern of mine, um... you go outside and when you look at things and pollution, I mean you know, it's dangerous levels already. Uh, anyway, I couldn't afford one [a hybrid electric vehicle] either but I decided that I wanted the smallest car, you know, sports car with a small engine, good gas mileage. That way I'll be contributing least... to... to the greenhouse gases.

Marissa expressed the same idea in these words:

My husband and I are fairly green, but... and we thought of looking at the gas mileage and the car size as part of our ecological contribution. You know we got the Corolla not the bigger one. We got the Tacoma not the Tundra.

In response to the facilitator's direct question about the role of environmental concerns in the vehicle buying process, more than half of the participants said that their preference for fuel-efficient vehicles was, at least in part, based on wanting to minimize the environmental impacts of their driving, but this appeared to be an after-the-fact response, prompted by the facilitator's question. Tony, Hannah, and Tonya, for example, reflected this. Tony said:

When I'm going to buy a car, I don't really think about how it affects the environment. But I always buy a car that is, you know, has better gas mileage. So, maybe that kind of correlates [laughs].

Similarly, Hannah said:

Mine was like in terms of gas mileage which I guess is indirectly environmentally... friendly... more... the better the gas mileage, the better... Um, I looked at, you know, buying a newer vehicle that got better gas mileage. And I was willing to pay a little bit more, you know... to have a better vehicle. Um... but I didn't have enough money to buy, you know, a Prius or something. So I think that, in terms of what I had to spend, I was able to get something that I thought would be an environmental choice compared to what my options were.

And Tonya explained: "At the time when I purchased, no it did not. Um, but I think that gas mileage kind of goes along with helping the environment."

When prodded to consider whether a preference for fuel efficiency was truly a reflection of an environmental concern, however, this exchange in the fourth focus group summed up how most of the participants felt:

Facilitator: Okay, when you think about gas mileage, uh... you know, we were talking about the price of gas, the... good gas mileage equaling money savings... Which is more important, the money savings or the effect on the environment? Just really quick, honestly and off the top of your head.

Rick: Money.

Simon: Money.

Facilitator: Money?

[Tyson, Katrena, and Jerry nod their heads. Rob grunts in affirmative.]

Facilitator: Money?

Jerry: Money.

Facilitator: [to Katrena] Money?

Katrena: Yea.

Facilitator: Okay. Um... Do you ever...

Rick: We're all probably going to burn in hell! [laughs]

## Sources of Information

To understand what influenced participants' priorities and preferences, the facilitator asked about the sources of information they used to learn about vehicle options when they were in the market for a new vehicle (whether new from the dealership or a used vehicle new to them). Not surprisingly, the participants drew upon a variety of sources, with one of the most important being networks of social relations with family members, friends, and co-workers.

Fred said:

I definitely get an opinion, um...buying a vehicle... a certain vehicle because the simple fact that my step-dad is you know, knows cars a lot better than I do. So... yeah, influenced. I would probably say yeah.

As for Wayne, he also mentioned family:

I'm blessed to have a dad who's been a diesel mechanic since he was eight years old. My dad is the bomb! I mean always go to dear ol' dad. I would be foolish not to. He instructs me and he leads and guides me to the best buys. I've been successful thus far.

Manny mentioned friends:

And also I've had friends that have had Hondas before, so I think I've been influenced by friends. Um, what they had to say about the cars as far as their reliability and gas mileage.

And Zoe mentioned a friend who is a mechanic:

And then I have a friend that's a mechanic and like...him I, you know, ask him what cars are the worst and which cars do you hardly ever see coming in.

Published sources of information were cited by almost every participant, with the Internet being used to access information from local dealers, from vehicle valuation companies such as Edmunds.com and Kelley Blue Book, and from magazines and newspapers including *Consumer Reports*, the *Sacramento Bee*, and a free classified ad paper, the *Penny Saver*.

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For some participants, test drives and conversations with salespeople gave them reasons to favor some makes and vehicle types over others. Finally, participants also relied on their own past experiences with different vehicles to help them choose a new vehicle. Important experiences were satisfaction with past cars in the household and use of company vehicles.

When it came to getting information about the environmental performance of cars, a theme that emerged was distrust, whether participants got the information from manufacturers, automotive salespeople, advertisers, or U.S. government sources. Marissa, for example, said:

I didn't mean that the government was going to give me true information. What I meant was you know when somebody comes out with some kind of information about something it's the government and I, like I said, I'm a conspiratist. You know? Somebody's behind it pushing some kind of personal agenda.

Her skepticism included salespeople:

I mean *nobody* trusts a car salesman. Let alone a used car salesman... it's like they lose all their scruples when they gotta try to sell a car on the lot.

This sense that information available to car buyers is untrustworthy struck a chord with other participants. Zoe agreed with Marissa and expressed the same skepticism about information available on the Internet. Darrin followed up on Zoe's comment by saying, "I don't trust car salesmen. I don't trust the auto industry." And Samuel felt that data from car companies, the media and government agencies was manipulated to confuse and obscure:

They want you to know... they want you to believe the biggest vehicle is the biggest polluter. When not... that's not necessarily the facts. They never give statistics when they give you a uh... thing. They give... they don't give you any comparison data. Never. And the car companies are the worst because the only thing that they want you to know is how fun it is to drive.

Facilitator: But define "they." Who are these people giving you false information?

Samuel: [pause] News outlets.

Pat: News outlets?

Doug: Media.

Samuel: The media.

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## **KNOWLEDGE OF THE ENVIRONMENTAL IMPACTS OF VEHICLE OWNERSHIP AND USE**

When asked directly about the relationship between vehicles and the natural environment, participants acknowledged that the vehicles they own have an impact on the environment. Not a single person challenged the notion that vehicle ownership and use has a negative impact on the environment. The first focus group, for example, had the following exchange:

Facilitator: How many of you believe that the vehicle that you drive and the driving that you do has an impact on the environment?  
[Everyone raises their hands]

Specific responses to the direct question, “What impact do vehicles have on the environment?” included the following quotes, which came from different focus groups:

Issa: I think every car has an impact, even a hybrid has an impact, so...  
Keith: I’m sure. I’m sure it [his car] affects the environment in all different kinds of ways.  
Samuel: Um... obviously an internal combustion engine is going to have some impact on the environment.

### **People Believe There is Some Impact but are Unsure of the Details**

Despite participants’ certainty about the impacts of their cars and light duty trucks, an unexpected finding was how consistently participants said they really did not understand what those impacts were. Not a single one of the participants expressed confidence that he or she had a good understanding of vehicles’ impacts the environment. A comment from Katrena illustrates this lack of knowledge succinctly: “I know I *do* [have an impact on the environment when I drive], but I don’t know exactly what it is.”

Rick seconded her, responding to her comment with:

I don’t know what it is. I mean I drive about 25,000 miles a year. In an SUV. So obviously I’m having an impact.

Even when participants mentioned a specific impact of vehicle use, they tended to express hesitation. Tony, for example, said:

Yeah, even though I believe my... my vehicle is, uh... very environmental friendly, but I still think it has caused some damage. Uh... maybe they have... I... my... the emissions have maybe contributed to the melting of the glacier... melt the ice and that kind of thing.

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## People Have Significant Misunderstandings About How Vehicles Impact the Environment

Among the people who described specific impacts that vehicles have on the environment, about half of the statements revealed serious confusion or misunderstanding about those impacts. One common misunderstanding was that participants had mistaken impressions about the relative environmental impacts of owning and using private vehicles versus the impact of other consumer behaviors. For example, Fred believed battery disposal is more environmentally damaging than the combustion of motor fuels:

Because of the cells, the electricity that comes in to charge the batteries. They're uh... I mean once those batteries are... done, it's dead. The uh... they dispose of those batteries and the size that it is... is more damaging to the environment than the gas vehicle.

In another misconception, Rachel said that she, "... read an article that the lawn mowers create more pollution than the cars." And Zoe believed the disposal of plastic products is a more significant environmental problem than the use of motor fuels for cars:

Well sometimes I think if they quit making the plastic bags, I mean mandating no more plastic bags at stores period, that would make uh... a bigger uh... difference in our environment than fighting this, you know, flex-fuel, electric, battery-operated, or gasoline uh... issue. We're not seeing car parts floating in the ocean when you see a documentary on TV. You see three miles of *plastic* that are bags and six packs [picks up an empty aluminum can], you know, whatever you call those things.

Participants also revealed considerable ignorance about different types of vehicle emissions, including the distinction between those causing air pollution and the carbon dioxide emissions that contribute to climate change. Some participants correctly knew that carbon dioxide is emitted by cars and light trucks, but they were incorrect in their understanding of its impacts. Some thought it is a poisonous gas and others said that it depletes the ozone layer. Harold, for example, said:

Well, I know my car produces carbon dioxide. And for a human being that's poisonous as greenhouse gas. And what we breathe is oxygen. And that's made by plants and trees and stuff. And so, I know I'm... uh... my carbon dioxide isn't doing anybody any good.

Another participant, Felicia, mistakenly conflated global warming and ozone depletion:

Yeah, I don't really have numbers, but, um... driving emits carbon dioxide which, um... which produces more greenhouse gases and, um... depletes the ozone, which increases the temperature of the earth making it kind of like the "greenhouse effect," or whatever.

Fred and Tonya also incorrectly linked vehicle emissions to damage to the ozone layer. Other misconceptions include Ken's assertion that early steam-powered cars had little environmental impacts. When describing the vehicle he would most like to purchase, if cost were not a constraint, he said:

It would probably be a restored Model A, you know... steam powered car. Like out of the '20s. I'm really into old cars but I just don't have the money to buy them and those virtually didn't have much of an impact. They just evaporated off of like the steam.

A final common assumption that made it difficult for about half of the participants to evaluate their vehicle options accurately is that the only vehicles that they perceived as pro-environment were hybrid-electric cars or light duty trucks.

Facilitator: Nobody here mentioned, um... environmental concerns when you go to purchase a vehicle, if any environmental concerns you have enter into the decision making process. Does it?

Zoe: They will for my next car. I... I think I didn't know enough and the price and the waiting time to get into a vehicle like that was so long and so high when they first started coming out with the hybrids and... and the, uh... more environmentally safe vehicles to where now my next purchase will probably be one.

In another conversation, Wayne said something very much similar:

Well... well for me, like I said, I got my credit to the point where I don't want to touch it anymore. You know, I'll massage it but I'm not going to touch it. [laughs] You know... I'm not going to get in there and I can't... I can't... find a low cost used hybrid car that I can spend, you know... I haven't seen one for seven, eight thousand dollars.

In response to the facilitator's question "Would you investigate or do more research if you decided to buy an environmentally friendly vehicle as opposed to one of the regular brands?" Rachel replied:

Definitely... because, um... my understanding is that they... they do have different technology. Like the uh... Ford hybrid is a little bit different from the Prius and the Saturn hybrid is a little bit different. So you really uh... you really have more apples and oranges to play on in terms of technology.

However, not all participants assumed that only hybrid vehicles are environmentally preferable choices. A few recognized that fuel efficiency and the size of a vehicle are both important to the environmental impacts of the vehicle and that non-hybrid vehicles can compare favorably to hybrid vehicles in this respect. Karl, for example, said:



I think the idea is a smaller car generally like the Corolla, you're getting good gas mileage. And the trick is to maintain it, you tune it up and make sure you're not getting black smoke coming out of it. [laughs] So you know, then you're doing your best, eh, I think, um... Like I... I get... when I go to the Bay Area, I get 35 to 40 miles a gallon and I had people say, "Why don't you get a Prius? You'll get 45 or 50." And I go, "Well, I'm doing pretty good."

## **PERCEIVED CONSTRAINTS TO CHOOSING ENVIRONMENTALLY FRIENDLY VEHICLES**

As was gleaned from this study's analysis of participants' comments, only four out of the 36 participants in these focus group sessions chose to buy vehicles that reflected, at least in part, their concerns for protecting the natural environment: Issa, Amy, Harold, and Marissa all bought vehicles that were smaller or less powerful than they would otherwise have preferred. Most of the other 32 participants, however—as a result of being asked to consider the environmental impacts of their vehicle choices—recognized that they *could have* chosen, but did not choose, vehicles with smaller impacts on the environment, cars and light duty trucks that require fewer resources to produce, that use less fuel per mile driven, or that emit fewer pollutants into the environment.

In responding to the facilitator's questions and conversing with others in the session, many of the participants experienced cognitive dissonance—a discomfort caused by acknowledging that they feel strongly about ideas that are contradictory—that prompted explanations of why they profess pro-environment attitudes yet own vehicles that do not reflect those attitudes. Numerous constraints in their personal circumstances and in the world outside of their control prevented them, they said, from buying a more environmentally friendly car or light duty truck.

Many participants expressed regret, guilt, or a need to rationalize their decisions when put in the position of acknowledging that they had not prioritized protecting the natural environment. The most frequent reason given was that buying a more sustainable car was too expensive for their budgets. Other constraints that participants mentioned included that sustainable vehicles do not offer features the participants need or want, the technology is not yet proven, the fueling infrastructure for alternative fuel vehicles does not exist, and that compensating behaviors make owning a sustainable vehicle unnecessary.

### **Sustainable Vehicles Are Too Expensive**

By far the most common reason participants gave for not choosing an environmentally friendly vehicle was that hybrids, the only option most of them considered environmentally friendly, were too expensive. The following sample of comments came up in different focus groups and in different parts of the discussions:

Keisha: There's really no option for me. I don't have um...environmental money. So I can't... I cannot always make environmental decisions based on my limited income. So I can't always do what I want to do.

Hannah: I looked at, you know, buying a newer vehicle that got better gas mileage. And I was willing to pay a little bit more, you know, to have a better vehicle. Umm... but I didn't have enough money to buy, you know, a *Prius* or something.

Simon: I looked at the tradeoffs between you know, the extra cost of going to hybrid versus regular. Um, I put paper to pencil and it just didn't make sense to me... even though I wanted to go that route. It just didn't make financial sense.

Marissa: And... and I don't have a bunch of money to throw around. And when I spend 12,000 dollars, 14,000 dollars on a car, which is what we bought our Corolla for, because we shopped around and, uh... I don't have 18,000 and 22,000 for the Prius, and that's even low end for the Prius. Let alone, come up with another 12,000 dollars three years later to put in a new battery in it. You know?

Katrena: That was probably the same with me because I was interested in the hybrid too. But, um, you know... I'm... I'm a single, um, you know, just myself. A single parent and two children. So cost was definitely an issue, um... although like, I wanted to go that route but I really just couldn't because, um... don't know what I was able to put forth for a payment every month.

### **Sustainable Vehicles Don't Provide Needed Features**

Other participants felt that they needed vehicle features that precluded them from buying a hybrid-electric vehicle. Rick, for example, said:

I'm a little big. And most of the hybrids that I've seen out there, uh, they're... they're small. I'm sorry, I got a big ass and it doesn't fit very well in many cars. And especially, it seems stupid but for me to have to... to move down into those cars so low on the ground, it's painful. And to get back on up, it's painful. It's really nice to swing straight on into a car, um... for me. And the only ones that do that for me are the big cars.

Jerry, in the same group as Rick, said, "The reason we didn't get it is because we have a motor home we can't tow... we can't tow a hybrid behind a motor home." Later in the session, he continued with his assessment of the deficiencies of hybrid vehicles:

I would love to have bought a Toyota Camry hybrid, but the trunk space is half the size. So you can't even do a Costco run, yeah, you have no... you'd have everything in the back seat. So the big problem with some of the hybrids is that there's no... not a lot of storage capacity for cargo to take things. So... it becomes an issue.

Allie didn't consider a hybrid because she wanted to own a sports car and didn't believe there were hybrid options:

I had the same feeling actually... Um, when I was going to buy a sports car two, three years ago. I didn't consider environmental issues at all. Cause I knew I wasn't going to be able to get something like that with a sports car.

Hannah considered a smaller, more fuel-efficient vehicle (not necessarily a hybrid) but rejected it as not meeting her other needs:

Because for me I needed... you know... a sedan car to have enough space for my friends and all the activities that I do. So I couldn't get, you know, a tiny car that maybe got better gas mileage.

Safety showed up as a concern for participants in the third focus group when considering what they consider to be an example of a very fuel efficient vehicle, as this exchange shows:

Marissa: Oh! The Smart Car is catching on. Isn't it? I mean I start seeing... those... those little things that just look like they're going down the street in a bubble gum bubble.

Zoe: It was cute in Italy but I just don't feel I can do...

Doug: Save the price of a coffin. [Doug and Samuel laugh]

Tonya: Only if everybody else is in one.

Facilitator: Now... I'm sorry.

Tonya: Only if everybody else is one.

Samuel: That's right. That's right.

Facilitator: Okay if everyone else were in a Smart Car...

Darrin: And that will never happen because you need big vehicles to haul merchandise and things around the country.

Issa and Darrin, in separate focus group sessions, expressed similar concerns about small cars:

Issa: That small... um... just the scary thought of be... being in an accident with the... in that car [a Toyota Prius]. Just a scary thought.

Darrin: I don't know how much steel it takes to go into a car. How much energy it takes to build certain vehicles. But I do know I wouldn't ride in one of those go-carts around town because they're so unsafe. Um... no matter how much mileage they get.

### **Hybrid Vehicles Are an Unproved Technology**

For other participants, a constraint to buying a hybrid vehicle was their belief that the technology is not mature, that hybrid-electric vehicles may prove to have technological flaws that have not yet been identified. Allie and Zoe, in different conversations, made the same point:

Allie: I guess I'm still kind of suspicious of the technology and how reliable it is with hybrids. I don't know very many people that have had hybrids, so I

don't have a whole lot of word of mouth experience with hybrids.

Zoe: I'm feeling like I'm on the fence, wanting to do the right thing, trying to do little changes and then not wanting to get suckered when I do buy, uh... a car. Because this friend that has the Prius loves it, but, you know, didn't do his homework, didn't realize it would cost so much to buy one part [replacement batteries] and that's changing his influence on the next vehicle that he buys.

Marissa, in the third focus group, summed up her suspicion of the technology by saying she wouldn't consider a hybrid, or at least, ". . . not 'til we're past the beta stage."

Social networks proved to be an important source of information for participants when they were buying vehicles, but when family and friends were unfamiliar with specific vehicles and technologies, that lack of information and experience proved a barrier. Allie said:

I guess I'm still kind of suspicious of the technology and how reliable it is with hybrids. I don't know very many people that have had hybrids, so I don't have a whole lot of word of mouth experience with hybrids.

Felicia, by contrast, defined the problem as the fact that hybrids weren't yet discussed very much by the mainstream media:

They're [hybrid vehicles] not as talked about. They're not as mainstream. So you would... I would think that... I know I would have to go out and... and inquire about information about it. Because you see, just in the mainstream media you don't hear much about alternative cars.

## **The Fueling Infrastructure Does Not Exist for Alternative Fuel Vehicles**

A few of the participants mentioned vehicles using alternative fuels as more environmentally friendly choices. However, they explained that they wouldn't consider buying an alternative fuel vehicle because there was still no widely available infrastructure for fueling them. For example, Marissa said:

If it was easier to get the alternative fuels, we would use it. I think that... that really us as a... a... society are willing to make these changes. I think a lot of us are really aware that...of our environment and what we're doing to our environment and stuff. But it's like "the powers that be" um... want their status quo and so you... you know and... and I'm lazy, I won't drive to LA to fill up you know with alternative fuel. But if it was here in Sacramento, I would probably drive three or four miles to get to the station that would offer that.

Issa considered compressed natural gas a preferable fuel option, but was skeptical that U.S. environmental regulations would permit its use in private vehicles:

I have seen back home when I go to Pakistan, I'm from Pakistan. They... they take the regular... they buy the car... Toyota, Civic or... Corolla or

whatever they have, brand new. They will take it to the mechanic, they will place a CNG right in the brand new car. Over here if you try to do it... all these environmental rules and all these state laws, you would be unable to do anything here.

### **Belief That Individual Actions Don't Make a Difference**

A couple of participants felt discouraged by a sense of inability to affect important problems such as climate change, the psychological concept of *efficacy*. Allie, for example, said:

I'm actually of the opinion that at this point because of the environmental changes that are already in place, the cascading effect... it's too late. They're really... I mean honestly! Unless we stop... everybody stops driving their cars... we literally got rid of our... all cars and a great deal of manufacturing... I... I don't think we're going to be able to do anything. I think it's too late.

Rick expressed a similar pessimism about the efficacy of any actions taken to reduce the environmental impacts of owning and using cars:

Because it seems like an almost unsolvable problem because everybody in the entire world has an effect on everybody else and there's large segments of the population in this world that truly don't care. And there are a lot of people who would like to have their standard of living raised to the level that we are. And we're just burning everything up and they're not really going to have a chance. So it's kind of a... It seems like a story with a very sad ending.

### **The Routine and the Comfortable Sometimes Prevent Change**

While some participants were discouraged from buying smaller, more fuel-efficient vehicles by a sense of inefficacy, two other participants described how habits made it difficult to act more responsibly toward the natural environment or to maintain a new, more environmentally responsible behavior they felt obliged to adopt. Harry said:

When you hear it... cause everyone wants to say that, yes, you know, uh... it's something they want to... they want to make a change and things like that. But we lived the same way for so long, it's kind of hard to just make that change in... regard to... you know... your lifestyle.

And Brett said:

The other thing, too, is I... when gas prices got kind of high, I started car pooling and I even started taking the bus. But then as the gas came down lower, the bus drive was longer so I just went back to my normal habits.

Habits reflect useful mental and behavioral shortcuts, allowing people to make decisions more quickly and without weighing alternatives when they are in familiar circumstances.

But they can impede consideration of unfamiliar or out-of-the-ordinary options that could be required by a desire to fit a choice of a new vehicle (or decisions about how frequently and how much to use a vehicle) to a strong desire to protect or limit damage to the natural environment.

### **Compensating Behaviors, in Some Cases, Discourage More Sustainable Vehicle Choices**

Another constraint to buying a sustainable vehicle arises from the perspective that limiting driving and keeping a vehicle well maintained makes up for, or balances out, a vehicle that is more polluting and less fuel efficient. For example, Doug said:

Well of course, I'm going to have an impact. But, uh... I don't drive at all that much. Um, I do keep it in tip-top condition so we'll get the best emissions that it can possibly get, gas mileage, performance and all that.

Similarly, Amy said:

I'm kind of like, "Ah! I should have just gotten the hybrid or something that I can plug in at night and then I don't have to feel so guilty," but... but I only drive really on the weekends so I feel like maybe that kind of balances it out.

And Zoe, Simon, and Marissa made similar comments at different points in the conversations:

Zoe: I think because I have an older vehicle, it is. And so I've been carpooling, um, walking, riding my bicycle when it's really close and it's just short little trips to the store or to school or to something like that. I'm using more fuel when I'm driving it because it's an older car, but I've adjusted to that by driving less, carpooling.

Simon: I'm trying to live close to where I work, minimize the amount of commutes. That's more the impacts I feel that I can have versus the car purchase. I'd love to have a second inexpensive car that could be great for the commuting like the hybrid, but, you know... the costs, the insurance, keeping up with it. It's not feasible or doesn't seem to make sense to me.

Marissa: [T]here's a lot... a lot of us are in the same boat. Although I try to minimize it, you know, by having a smaller car. I have "errand day" instead of getting out to the car everyday of the week... And, you know, I enjoy going up to Reno. I enjoy, you know, my little trips around. Like I said, I try to, uh, consolidate them, but I have my fun errand on the same day I'm doing the other errands.

For these participants, travel behavior choices justify, at least in part, their decision to own larger, less fuel-efficient vehicles than they might otherwise. And that attitude is reasonable in that such compensating behaviors *are* directly related to the environmental impact of

their vehicles. A few participants, however, linked behaviors in other domains of their lives to their vehicle choices. For example, Wayne explained that the cost savings associated with the fuel efficiency of his vehicle was more important to him than the environmental impacts because he takes other actions to be environmentally responsible.

Wayne: For me it's money... Because I take steps to, you know, not harm the environment. And I also... I'm also proactive in helping protect the environment. So...

Facilitator: What steps do you take? What do you do?

Wayne: Um... well, what I do is I get on my friends' case when they're not recycling. You know? And I... it's just... little things. I'm not... you know... walking out with signs and things like that. But you know, I... I help them realize, "Look, you're throwing away money."

Tonya made a similar argument:

I think for me, in my household in my family, we do... we could probably do more, I'm sure everybody could. But we do our share. We recycle pretty much everything, reuse everything we could possibly reuse. I carpool to work 'cause I found a co-worker that lives in my neighborhood. We switch off weeks.

Allie described how she loves her BMW sports car, finding it fun to drive and also very safe. When the moderator directly asked if it fits with her environmental beliefs, she said:

Not in the slightest! [people laugh] I... I'll recycle, I'll pay extra for electricity, um, I'll sign up for whatever green SMUD [Sacramento Municipal Utility District] thing that they have.

Facilitator: Now you're just trying to buy me off. [people laugh]

Allie: Yes, exactly! I'll do anything else that I can to make up for it.

Making consumption choices (for example, paying wind energy premiums for electricity) and behavioral choices (recycling, carpooling, performing preventive maintenance on their vehicles) to reduce environmental impacts is an important reflection of some participants' pro-environmental attitudes.<sup>22</sup> But if such choices are perceived as compensating for the environmental impacts of their cars and light duty trucks, they can become a barrier that prevents people from reducing their environmental impacts even more and aligning their attitudes and behavior more closely.





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## SUMMARY AND CONCLUSIONS

### ANALYSIS OF FINDINGS

The format of focus group sessions, which encourages a group of strangers to think about and comment on a semi-structured set of questions, provided our research team with an interesting and thought-provoking set of findings based upon our initial research questions.

#### **1. To what extent do people perceive that their vehicle ownership reflects their environmental attitudes?**

The simple answer to this question is that most of the participants in these focus group sessions did not perceive any connection between their vehicle ownership and their environmental attitudes *until the subject was broached in the structured conversations*. The vehicle purchase factors they remembered considering—reliability, safety, economic value, fuel economy as a way to save money, and aesthetic and functional preferences—simply did not include the environmental impacts of their choice.

After reflecting on the facilitator's question about the relationship between vehicles and the natural environment, a small minority of four participants said that they had bought vehicles that were smaller and more fuel-efficient than they otherwise would have preferred, in part because they wanted to reduce their negative impacts on the natural environment. For them, environmental attitudes directly influenced their vehicle purchases, but only as one of many factors in their decisions and apparently only in a modest way.

For the rest of the participants, when they were asked to consider this relationship between their vehicles and the natural environment, a relationship that they had not previously considered important, most acknowledged that their vehicles did not reflect their environmental attitudes very closely. A few of these participants were satisfied that their vehicle choices, given the other purchase factors they considered, were as good a fit with their pro-environment attitudes as they could be. (Tyson said, "well, not really... but I think it does as well as any car," and Katrena felt that, "I'm sure there's something better on the market... but for what I was able to do, I think it fits.")

#### **2. What barriers and constraints do people perceive to aligning their environmental attitudes with their vehicle ownership and use choices?**

When asked to think about their vehicles' impacts on the natural environment, most participants expressed an interest in aligning their environmental attitudes with their vehicle ownership more closely, *if only* a number of barriers didn't constrain their choices. The constraints to buying a smaller, more fuel-efficient vehicle that they noted were numerous: sustainable vehicles are too expensive, they do not offer needed or desired features (size, power, storage capacity, and comfort), the technology is too new, and the infrastructure does not exist to support alternative fuel vehicles. Some participants explained that their own personal habits prevented them from changing their vehicle purchase decisions, that their residential location obliged them to own a vehicle, and that the scale of environmental problems is so large that their efforts would be meaningless and ineffective whatever they do. In short, the vehicles on

the market, their family and work responsibilities, their residential choices, and their routines and preferences all constrained most participants' vehicle purchase and use choices to ones which poorly reflected their environmental attitudes.

Whether each of these constraints is objectively a barrier to action or a perception with little relation to actual circumstances cannot be known. Would buying a more sustainable vehicle still be unaffordable for Hannah if she considered a Ford Focus or a Honda Fit to be valid options (and not just hybrid vehicles)? Are shopping preferences (Jerry's Costco runs that would require having "everything on the back seat") always an impediment to owning a smaller car? Would Rick's back pain be worsened by driving a more fuel-efficient vehicle? The focus group sessions were not designed to verify the statements participants made, but simply to understand the opinions and beliefs that shaped their past decision-making. The perception that a barrier exists, whether supported or not by objective circumstances, can effectively constrain choices and block action.

The constraints previously described, whether real or simply perceived to be real, were ones that the participants explicitly stated and understood. Another set of constraints resulted from the participants' misinformation and uncertainty about the environmental impacts of owning and using cars and light duty trucks. Most participants said that they believed their vehicles affected the natural environment negatively, but they were generally uncertain as to what the impacts were and how they related to vehicle ownership and use. Many participants were unable to accurately compare the impacts of owning and using cars to other behaviors (i.e., using power lawnmowers or plastic shopping bags) or misunderstood the differences between air pollutants and greenhouse gas emissions. While having this information would not necessarily have led participants to make different vehicle choices, *not* having the information clearly prevented the participants from making well informed decisions about whether there was a more sustainable vehicle option that would have met their other needs. Better information on the environmental impacts of vehicles is likely a necessary condition for encouraging more environmentally responsible vehicle ownership, even if it is clearly not a sufficient condition.

### **3. What changes in personal circumstances and travel choices do people believe would permit them to bring their vehicle ownership more closely in line with their environmental attitudes?**

The focus group participants addressed this question in two ways. First, they addressed it in the negative by identifying the constraints that presently prevent them from aligning their vehicle ownership choices with their pro-environmental attitudes. They implied that they would buy a more sustainable vehicle the next time they are in the market for a car or truck *if* sustainable vehicles were less expensive, *if* they provided a wider range of features and capabilities, *if* the technology were considered more reliable and tested, *if* they felt capable of changing old habits, and *if* they perceived that their actions would have a positive effect on the natural environment. This is a substantial (and, for planners and policy makers, daunting) set of conditions to meet.

The question was also posed in every session, "if money were no object, what type of vehicle would you buy?" This question hypothetically removed the constraint most often cited by participants that environmentally friendly vehicles are too expensive. Slightly more

than half of the participants indicated they *would* select a more fuel-efficient vehicle than what they currently own, such as a hybrid-electric car or light duty truck or an alternatively fueled vehicle (bio-diesel and electric battery vehicles were mentioned several times). The other half? Even with cost hypothetically eliminated as a constraint, they chose vehicles that satisfied other preferences, such as Porsches, Bentleys, and Cadillacs, sports cars and luxury vehicles that would be *less* environmentally friendly than the vehicles they currently own.

Their responses to these questions and scenarios suggest that most participants would prefer the types of vehicles they currently own be made more fuel efficient and less polluting without sacrificing the functionality and features that they value most (reliability, safety, power, and others). Aligning their vehicle choices with their pro-environmental attitudes seems easiest if vehicle technology and motor fuels change; modifying behaviors, expectations, and desires were not volunteered as solutions to the attitudes-behavior gap.

## **POLICY IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH**

Assuming that the study findings hold true for the larger population (an assumption that can be tested in future research), our findings suggest two broad strategies to encourage more people to choose vehicles with lower environmental impacts. One strategy is to make the choice of buying a more fuel efficient, less polluting vehicle a simple, convenient, and desirable decision by addressing the most common constraints to doing so. The second is to increase vehicle buyers' environmental knowledge, by providing the public with explicit information on the link between vehicle ownership and the natural environment in a timely and effective manner. In the remainder of this report, we offer suggestions to achieve these two broad goals, as well as research options that would help identify those which would be most effective and the means to best implement them.

### **Recommendation 1: Make buying fuel efficient, low emission vehicles a desirable choice**

The results of the focus groups conversations suggest that the most relevant way to increase people's likelihood of choosing a more sustainable vehicle is to reduce the real and perceived barriers that make them believe the more sustainable choices would not be feasible or good ones. The participants cited cost, features, residential choices, lifestyle preferences and other constraints as preventing them from making decisions to buy fuel efficient, low emissions vehicles. So an effective approach to promoting more sustainable vehicle choices would directly address these constraints by a) making more sustainable vehicles an affordable alternative, b) expanding the variety of amenities and features in sustainable vehicles, and c) making sustainable vehicles a more practical choice for car and truck buyers. Each of these objectives is discussed in more detail below.

Regarding the broader challenge of bridging the attitudes-behavior gap that these approaches address, further research is needed to better understand the details of these constraints. For example, which of the constraints that focus group participants cited represent the largest barriers to buying sustainable vehicles? Is cost—the most frequently cited constraint—the largest barrier, or are other constraints, less frequently cited, equally

or more important? How can constraints be assessed in terms of objective measures in order to distinguish real versus perceived barriers? And what role can planners and policy makers play in addressing these constraints and how can they support the work of engineers, manufacturers, land developers, urban designers and other professionals who also influence, in both direct and indirect ways, the car and truck buying process?

***1(a): Make sustainable vehicles an affordable option***

The most frequently cited constraint by focus group participants was the cost. Advances in research and technology will help weaken this constraint. As the technology and manufacturing of hybrid and other new engine types improve, and as alternative fuels production becomes commercially viable, economies of scale and market forces will bring the costs down.

In the meantime, planners and policy makers can provide incentives that reward vehicle buying decisions that reduce pollutant and greenhouse gas emissions and other environmental impacts with feebate programs, higher motor fuel taxes, and revisions to the “gas-guzzler” surcharge.<sup>23</sup> Research is needed to assess which incentives can be most effective and how they can be designed to price environmental externalities in a transparent manner. There is currently active debate among policymakers about modifying the set of taxes and fees currently assessed on vehicles and fuels, and this policy and research activity should be leveraged to investigate solutions to the current transportation financing gap that would support more environmentally aware vehicle purchases.

***1(b): Expand the variety of amenities and features available among sustainable vehicles***

Technological advances will contribute to addressing the desired features constraint that many focus group participants noted. Those who rejected sustainable vehicles as an option because of lifestyle activities (e.g., camping, dogs, shopping, socializing with friends) that, they believed, require larger, less fuel efficient vehicles will find more fuel efficient options in the future that retain the size, power, and functionality preferences they favor.

But in the short run, planners and policymakers may be able to influence vehicle purchase choices with parking, vehicle registration, and insurance policies that are designed to capture the environmental externalities that such preferences impose. Research into carsharing, an alternative means of ownership promoted by for-profit companies like Zipcar and non-profit organizations such as San Francisco City Carshare, could prove important in helping planners and policymakers address this constraint. For example, future research could explore the questions such as the following: To what extent can access to carsharing vehicles address lifestyle preferences? Is the frequency of such activities an important factor (camping or kayaking, for example, may happen only once every several months, while dog-walking can be a daily event)? And can access to larger vehicles through other means, such as home delivery of larger purchases by retailers, affect vehicle purchase choices?

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**1(c): Use city planning and design tools to make sustainable vehicles a more practical option**

Finally, policy-makers and planners may be able to use land use, transportation and other planning tools to partially address the current perception that sustainable vehicle options cannot provide desired features and amenities. For example, efforts to eliminate food deserts—neighborhoods where access to foods necessary for a healthy diet is limited or non-existent—may reduce the need to travel long distances for large shopping trips. Attending to public spaces (sidewalks, parks, plazas, and commercial areas) and encouraging mixed-use development and *re*-development could provide more nearby opportunities to walk dogs, socialize and recreate, reducing the need for larger, less fuel efficient vehicles.

While such strategies are long-term and challenging, it is clear that they would address some of the constraints that focus group participants mentioned. It is unclear, however, how effective community planning efforts would be. Though the relationship between the built environment and travel behavior has received close attention from researchers in the past decade, less clear is the impact on vehicle type choice. Future research could address questions on this topic. For example, can better local and regional access to destinations affect the size, power, and fuel efficiency of vehicle purchase decisions? If so, what types of community design are most closely related to sustainable vehicle choices? And how would improving shared transportation services (public transit, taxis, jitneys and other modes) and non-motorized transportation amenities (bike lanes and paths, for example, sidewalks and pedestrian signalization) affect both the numbers and types of vehicles purchased?

**Recommendation 2: Help consumers integrate knowledge about the environmental impacts of vehicles into their vehicle purchase decisions**

Knowing that pro-environmental concerns rarely occurred to focus group participants during the process of buying a car or light duty truck and that environmental impacts were a low priority for a few and not a priority at all for most, planners and policy makers should recognize that making the link between vehicle ownership and the natural environment explicit for consumers is a significant challenge. Still, because about half of the participants in these focus group sessions showed concern about the impacts of their vehicle on the environment, providing *more accurate* information about the environmental impacts of vehicles *during* the purchasing process could influence their future choices. Even for the other half, for whom the relationship between vehicles and the natural environment is one that is unlikely to be a high priority under any circumstances, providing more accurate information about the costs of fuel inefficiency and their impact on the principal purpose of owning a vehicle—travel between destinations—could lead to more environmentally responsible choices. Developing public information and social marketing strategies to correct the misconceptions and encourage consideration of the environmental impacts of vehicle choices has the potential to be an important contribution to making vehicle ownership more environmentally sustainable than it would otherwise be.

***2(a): Increase public knowledge of the environmental impacts of owning and using vehicles***

Educating the public more about the environmental impacts of vehicles may be an important factor in encouraging people with pro-environmental attitudes to buy more environmentally friendly vehicles. The four focus group discussions revealed that for many people, there are significant gaps in knowledge as well as outright misunderstandings and inaccuracies, in what they believe to be the links between the natural environment and vehicle ownership and use. Filling those gaps with clear and accurate information, presented in an impartial and transparent manner, would require a considerable effort because of the level of mistrust of media and government sources and because of the billions of dollars in car and truck advertising that promotes other characteristics of vehicles. But the effort would give an opportunity to those with pro-environmental attitudes to understand better the options available to them and, if the co-occurring economic benefits are emphasized along with the environmental benefits, such information may sway even consumers without any particular pro-environmental leanings.

Several key misunderstandings were revealed in the focus group discussions and, if they are common amongst other Americans, they are compromising effective decision-making by car and light duty truck buyers. Perhaps most important is the misconception that only hybrid-electric vehicles are sustainable. People who share this idea will likely find that concerns about cost and hesitancy around new technologies prove insurmountable barriers, preventing them from making a sustainable vehicle choice. This misconception can also lead to the belief that the environmentally responsible choices are only available to the wealthy. Fuel efficient vehicles such as the Toyota Yaris, Ford Fiesta, and Volkswagen Jetta will not even be considered as options that can satisfy traditional priorities (reliability, safety, comfort and preferred features) while reducing environmental impacts. Similarly, buyers who want another class of vehicle will not realize that there are substantial differences in the environmental impacts among the options for each class of car. Finally, the confusion of pollutant emissions (subject to emissions standards that automobile manufacturers must adhere to and publicize) with greenhouse gas emissions made it difficult for some participants to accurately assess the environmental impacts of their vehicles.

There are numerous unknowns about the general public's understanding of the link between vehicles and the environment. Important questions for research include the following. How prevalent are the misconceptions previously noted? In vehicle buyers' minds, what characteristics of a vehicle are most directly associated with the environmental impacts of cars and light duty trucks? Do significant numbers of people assume that only new, hybrid-electric vehicles can be sustainable? What explains the concerns and fears that some people express toward new technologies? If more accurate information were provided, what effect would it have on stated preferences and would these later be reflected in revealed preferences at the time of purchase? What methods of information dissemination would be most effective in the new car and truck market? And in the used car and truck market?

Related to broader questions concerning the information available about the environmental impacts of vehicles are more specific questions about the U.S. Environmental Protection Agency's (EPA) fuel efficiency ratings and how they can be used more effectively. Several participants expressed frustration at the differences between labeled and real-world fuel efficiencies, as measured by miles per gallon. This is a problem recognized by U.S. EPA fuel efficiency experts, and changes to the measurement of fuel economy have been made in recent years. But additional questions remain for future research. For example, how well do car and light duty truck buyers understand EPA labeling? How is EPA labeling used by salespeople and car and light duty truck buyers? How can EPA labeling be improved to permit better comparisons of comparably-sized vehicles in terms of relative environmental impacts? And how can EPA testing results be more easily accessible in the substantial used car market?

***2(b): Provide information to consumers about the environment at the right time in the vehicle purchase process***

Most participants in these four focus groups did not have fervently pro-environmental attitudes, so providing general public education about the environmental impacts of owning and using vehicles is unlikely to be sufficient to change the vehicle purchase decisions for many. Comments by several participants suggest that the *timing* of the provision of information is likely to be very important. These participants said that had they had access to better information that they trusted—from car salesmen, during their online research, in vehicle advertising—while they were in the process of selecting a car or light duty truck to buy, they would have been more likely to buy a more sustainable vehicle.

Future research is needed to address a range of questions about how to integrate environmental knowledge into the vehicle purchase process effectively. For example, how could better, more accurate information about the environmental impacts of owning and using vehicles be provided during the vehicle purchase process itself? By whom and at what point in the car buying process? What differences in information dissemination would need to be adopted for the used car market? Given the importance of Internet sources of information in the vehicle buying process, how can accurate, clear, trusted, and timely information be provided online? How does the multi-billion dollar vehicle advertising market affect knowledge of the environmental impacts of owning and using vehicles?

***2(c): Promote a sense of individual efficacy and help change ingrained habits***

To be successful, educational and information campaigns need to include motivational elements that help overcome both the sense that environmental problems are so large that an individual's actions are irrelevant and the difficulty of changing habitual behaviors and consumer patterns. While an individual's decisions influence the tonnage of greenhouse gas emissions in only a minuscule way, his or her decisions can influence their personal environmental impacts and that of their household in significant ways. One choice of a car or truck to buy can be a third or even half as consumptive of energy as another: the 2010 Honda Fit's EPA estimated annual emissions of 6.0 tons of greenhouse gases, for example, are about a third less than the same model year Mazda Speed 3's emissions of 8.9 tons. The cost savings, in motor fuel expenses, can influence other choices and behaviors,

leading to still greater reductions in environmental impacts. And given the importance of the decisions and opinions of people within social networks, one person's choice to buy a more fuel efficient, lower emission vehicle may have a broader and larger influence on family members, friends, and co-workers.

Research into the relationship of individuals' sense of efficacy and their personal habits, on the one hand, and their vehicle ownership on the other could help address this constraint. For example, to what extent do they affect car and truck buyers? What messages about such infrequent, but environmentally consequential decisions would help address a sense of inefficacy or break a long-standing habit? How do one person's vehicle purchase decisions affect people within his or her larger social network? The skills and expertise of psychologists, marketing specialists, and economists could make significant contributions to the field of planning and travel behavior.

## **CONCLUSION**

The conversations that 36 individuals participated in during the fall of 2009 have helped identify the key factors that influenced their decisions about vehicle ownership and the role of pro-environmental attitudes. The complexity and multi-faceted nature of such decisions appear to leave only a small role for environmental concerns under current car and truck buying conditions. These individuals have helped us understand that *when the issue is addressed clearly and with thoughtfulness*, many people say they care about the environmental impacts of their choices, but they contend with significant constraints that act as barriers to effective action. While, as a group, they demonstrated serious misunderstandings and gaps in their knowledge of their cars' and trucks' impacts on the natural environment, their willingness to consider the issue reveals opportunities for planners and policymakers. Providing clear, accurate, and trustworthy environmental information while adopting policies to facilitate the choice of fuel efficient, low emissions vehicles has the potential to reduce the environmental impacts of vehicle ownership.



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## **APPENDIX A: FOCUS GROUP DISCUSSION GUIDE**

### **I. WELCOME**

Thank you for coming to our focus group this evening. My name is Pat. I will be leading our discussion.

### **II. OVERVIEW OF SESSION**

Before we get started, I'd like to tell you a little something about what we will be doing during the next two hours.

The purpose of the focus group is to learn more about how you make decisions about how many vehicles to own and what types. We'd like to learn what's important to you in buying a vehicle, including whether your opinions about environmental issues have influenced your vehicle choices. It doesn't matter what kind of vehicles your household owns—we're interested in everyone's opinions.

At the end of the session you will receive \$100.00 for your time and participation.

I have been hired by the Mineta Transportation Institute, which is part of San José State University. The university is studying these issues to help transportation planners do their work more effectively. I want you to know that I am an independent researcher so that you will be honest and not worry about saying something that is negative.

Please take a minute to fill out the questionnaire that has been placed by your seat. Staff will collect the questionnaires from you when they are complete.

### **PAUSE WHILE THEY FILL OUT THE QUESTIONNAIRE**

### **III. GROUND RULES**

- We expect everyone to be involved in the discussion.
- Everyone's opinions are important!
- We expect different views and opinions; we are not looking for agreement. Also, there are no right or wrong answers to any of these questions. So please feel free to tell us what you really think.
- If you have a cellular phone, please be sure it is turned off.
- When I use the word "vehicle" this evening, I'm referring to any car, van, mini-van, pickup truck or SUV that you use to get to and from work, shopping, and other destinations.
- All of your comments will remain anonymous. Nothing you say will be attributed to you.
- If at any time you are not comfortable with a question you may decline to answer the question. Also, you may terminate your participation in this focus group at any time.

## IV. INTRODUCTIONS

Before we start, I'd like to go around the table and have you introduce yourself. How about telling us your first name and what kind of vehicle (or vehicles) you own and drive?

## V. DISCUSSION

### A: DECISION-MAKING PROCESS—PEOPLE AND ISSUES INVOLVED

We would like to start by asking *how* vehicle buying decisions are made in your household. Think back to the most recent vehicle that you bought or leased.

1. Was that a decision you made on your own, or did you make the decision together with someone else in your household? (*Ask each person, in turn.*)
2. Who had more say in the decision process? (Husband/Wife/Children?)
3. What were the most important features or qualities you were looking for when you purchased this vehicle? (Examples that came up last night were: gas mileage, safety, aesthetics, cost, power, size) PROBE to ask people how they define these features (for example, if they say "size," ask what passengers or cargo they need to accommodate; if they say "gas mileage," ask if they are looking to get a certain miles-per-gallon)
4. For those of you who made a decision with someone else, was there agreement on what the most important features or qualities you needed in the vehicle, or did you have some differences of opinion about priorities?
5. Did you consider other vehicles before making your final decision?  
(**If yes**, PROBE: What makes, models, years?)
6. Where did you get information that helped you make your decision? (Examples: friends or family gave advice; dealers gave advice; stuff you read on the internet or in car magazines)

### B: EFFECT OF ENVIRONMENTAL ATTITUDES ON VEHICLE PURCHASE DECISION

1. When you were deciding what vehicle to buy, were there any environmental factors that you considered? (**If yes**, PROBE what environmental factors were important to you in choosing a vehicle to buy? And PROBE: Did you discuss with anyone [dealer, friends, spouse] environmental factors when choosing your vehicle)
2. **If no**: For those who said that environmental concerns were not important in buying your last vehicle, why weren't they important?

### C: KNOWLEDGE OF VEHICLES/ENVIRONMENT CONNECTION

Let's step back for a minute and talk about the impacts of vehicle ownership on the environment.

1. Do you think there are environmental impacts of owning and using vehicles? What are those impacts?
2. How much do the environmental impacts of owning and using vehicles concern you?

#### D: OWN VEHICLES AND ENVIRONMENTAL IMPACTS

For those of you who said that environmental issues were important in making your decision about which vehicle to buy, I'd like to hear more about the vehicle you bought.

1. How environmentally friendly is the last vehicle you bought?
2. What qualities make it good for the environment? What qualities of your vehicle are not environmentally friendly?
3. Where did you get information about the environmental qualities of your vehicle? (PROBE: Vehicle specs from the manufacturer? Friends or family? Newspapers or television? General knowledge?)

#### E: FIT WITH ENVIRONMENTAL ATTITUDES

1. Is your vehicle a good fit or a bad fit with the way you feel about the environment? (**If yes**, PROBE: In what ways do you feel it is a good fit?)
2. How many of you feel your vehicle does not fit with your environmental beliefs? (Ask each person who raises a hand:)
3. How do you feel about buying a vehicle that doesn't fit with your environmental beliefs?
4. Is there a vehicle on the market today that would be a better fit with your environmental beliefs? (If yes, PROBE: What make and model?)

#### F: VEHICLE USE

Think back to the spring and summer of 2008 when gasoline prices shot up to more than \$4.00 a gallon.

1. During that time, did you make any changes in your driving to save money on transportation costs?
2. What kinds of changes did you make and how did they help you save money? (PROBE: Did you drive a more fuel efficient vehicle or cut down on how far you drove?)
3. Now that gas prices have gone back down, have you gone back to the way you drove before the gas price spike or have you kept up any of the changes?
4. If you kept up any of the changes, what are your reasons for doing so?

### **VI. CONCLUSION**

Thank you very much for your time and suggestions. You have all been very helpful. Please see the hostess on your way out to receive your compensation for your time this evening.



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## APPENDIX B: TELEPHONE SCREENING SCRIPT

Hello, my name is \_\_\_\_\_ and I am calling on behalf of San José State University to see if you would be interested in participating in a focus group. This study is being done for the university to gain a better understanding of how people decide what type of motor vehicles to purchase and how much to drive those vehicles. Do you think you might be interested in participating?

YES (Continue)

NO (Thank the respondent and terminate the call.)

I just have a few questions to see if you fit the criteria for this focus group.

You don't have to answer any questions you don't want to, and of course you can end this call at any time. Your answers are strictly confidential and will only be used to help us determine if you are a good candidate to participate in one of our focus groups.

(NOTE IF MALE OR FEMALE)

MALE

FEMALE

1. Are you between the ages of 18–35; 35–45; 45–55; 55 or older?

Note age range: \_\_\_\_\_

If not in one of these age ranges, thank and terminate the call.

2. Have you purchased a vehicle in the last 5 years for your personal use?

YES (Continue)

NO (if no, thank the respondent and terminate the call)

3. Do you agree or disagree with the following statement? "We must protect the environment, even if it means paying higher prices for gasoline and electricity."

AGREE (Continue)

DISAGREE (thank and terminate the call)

4. Do you work in one of the following industries?

a. Marketing

b. Car manufacturing or dealership

c. Environmental advocacy (like the California EPA or the Sierra Club)

d. San José State University

YES to any of these (Thank and terminate)

NO (Continue)

Last questions—I have a few quick demographic questions that will help us balance our focus groups.

5. What is your race or ethnicity?
- a. White
  - b. Black or African American
  - c. Asian
  - d. Hispanic or Latino origin?
  - e. Other
  - f. Two or more races

(Circle all that apply *OR* write down whatever respondent says)

6. What is your highest level of education?
- a. Some high school
  - b. High school graduate
  - c. Some college
  - d. College graduate
  - e. Postgraduate degree

If you are interested in participating in the focus group, it will be between TIME in downtown Sacramento on DATE. Participants receive \$100 for attending. There will be 10–12 other people participating in the focus group.

Would you like to participate?

YES (Continue)

NO (Thank the respondent and terminate.)

The focus group will be held at (give exact address).

We will send you a letter to confirm your participation and provide all focus group information. May I please have your mailing address?

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Name:

Address:

City, State, Zip:

Phone number:

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END CALL.

## APPENDIX C: PARTICIPANT SURVEY

1. How many people, including yourself, live in your household?  
\_\_\_\_\_ people
2. How many members of your household, including yourself, are 16 years or older?  
\_\_\_\_\_ people
3. How many miles did you, personally, drive during the past 12 months? Do NOT count miles that you drove a car or truck as part of a job.
  - 0 miles
  - 1–3,000 miles
  - 3,001–7,500 miles
  - 7,501–12,500 miles
  - 12,501 or more miles
  - Don't know
4. In the PAST SEVEN DAYS, have you taken any form of public transit, like a bus, light rail, or a commuter train?
  - Yes       No
5. In the PAST SEVEN DAYS, have you walked or biked from your home to get to work, shopping, eating out, or some other destination?
  - Yes       No
6. Are you currently employed? (If NO, skip to question 9)
  - Yes     No (retired)     No (unemployed)
7. How many miles is your workplace from your home?  
\_\_\_\_\_ miles
8. In the PAST SEVEN DAYS, on how many days have you commuted to or from work by the following means?
 

___ days	Drive yourself
___ days	Carpool
___ days	Public transit (bus, light rail, train)
___ days	Bicycle
___ days	Walk

  - Please check this box if you always work from home and do not commute

9. For each vehicle in your household, please fill in the following table (up to 5 vehicles):

Vehicle Manufacturer (Example: Ford or Honda)	Vehicle Model (Example: Chevy <u>Malibu</u> or Toyota <u>Corolla</u> )	Model Year

Please CIRCLE the vehicle that you, personally, drive the most.



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## APPENDIX D: CODES

### FAMILY 1: VEHICLE OWNERSHIP DECISION FACTORS

#### 1.1 *Comfort*

- Definition: Preferences that participants have for a feature of a vehicle that makes them feel more comfortable or at ease, however they describe “comfort.”
- Examples: Comfortable, good ride, easy to get into the car (high off ground?).
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

#### 1.2 *Required vehicle features*

- Definition: Comments by participants describing vehicle features they consider necessary because of physical conditions (personal size, injuries, limitations), activities they are engaged in (camping, sports, home businesses), or responsibilities they have to others (children, pets, disabled relations).
- Examples: Comfort of the seats (support for back injury), 8-way power passenger seat for handicapped wife, seat comfortable given back/leg condition, clean air circulation within the car, internal air quality, room for dogs, able to pull a trailer or a motorhome, 4 doors (to accommodate kids).
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

#### 1.3 *Preferred vehicle features*

- Definition: Preferences that participants describe because the features make the vehicle fun/prestigious/exciting, as opposed to factors that allow them to perform desired tasks (as described in 1.1 and 1.2 above).
- Examples: Wanted luxury car, wanted sporty car, wanted 4-wheel drive, be able to relax when drive, convertible, leather seats, air conditioning, big trunk, looks pretty and new, performance, small size.
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

### **1.4 Safety**

- Definition: Comments related to participants' perceived confidence in the safety of a vehicle (high crash test ratings, size, visibility, etc.).
- Examples: Safe, survivability in a crash.
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

### **1.5 Reliability**

- Definition: Perceptions participants have that a vehicle will require little maintenance, that it will not need expensive repairs or parts replacements.
- Examples: Reliability, Don't want plastic stuff in the car, used vehicle should be in good mechanical condition.
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

### **1.6 Fuel efficiency**

- Definition: Comments related to the fuel efficiency of a vehicle, the number of miles it can be driven on a gallon of fuel (gasoline or diesel).
- Examples: [Good/Desirable] gas mileage.
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

### **1.7 Economic value**

- Definition: Perceptions that a vehicle is well priced, that the cost is a good value for the functionality and desirability of the vehicle.
- Examples: Long warranty, cost.
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

## **1.8 Other decision factors**

- Definition: Factors not covered in other categories of the vehicle purchase decision family.
- Examples: Environmental performance, car came with free trip to Sweden, car was a gift, brand loyalty, refuse to buy an American car, hand-me-down vehicle.
- Analysis: This and all other codes in this family of codes will permit us to understand the factors related to vehicle choice that participants felt strongly enough about to mention during the discussion. They are all post facto expressions of importance and may not reflect all of the factors that were considered at the time of vehicle purchase in the past, but they are the factors that at the time of the discussion occurred to them as important and noteworthy.

## **FAMILY 2: ENVIRONMENTAL BELIEFS**

### **2.1 Environmental beliefs regarding the environmental impacts of vehicle ownership and use**

- Definition: Any quotations in which participants discuss what they know or believe about the environmental impacts of vehicle ownership or use, including statements that describe or define what makes a car “environmentally friendly.”
- Inclusions: Statements both about how vehicles in general impact the environment, and also how their personal vehicle use/ownership impacts the environment.
- Examples: cars emit “pollutants,” we are filling landfills with old cars, hybrids are good for the environment, it's important to have a car whose parts can be recycled.
- Note: This code will include a significant number of statements concerning hybrid vehicles.
- Analysis: Will help us to understand what environmental attitudes the participants may hold. We may also be able to use this information to assess what types of vehicles respondents think would be environmentally friendly, or what actions they think they could take to reduce the impact of their personal vehicle use.

### **2.2 Good mileage**

- Definition: How the person defines or perceives good gas mileage.
- Examples: 20 mpg is good gas mileage for an SUV; at least 25 miles per gallon.
- Note: While this could be included in EKB-F2, it was consistently referred to, will be simple to code, and could help us set other comments by the same participant in context.
- Analysis: This material will help us to understand what participants believe to be a desirable fuel efficiency standard.

### **2.3 Sources of environmental beliefs**

- Definition: Any mention of where people have learned about the environmental impact of specific vehicles or of vehicle use/ownership in general.
- Examples: friends, car ads, car salespeople, public service ads.

- Inclusions: any statements about where they think they think this information should come from, as well as where they have actually gotten information.
- Analysis: Will help us to assess how people develop their knowledge about the environment and vehicle use. Might help us to understand their overall lack of knowledge and their incorrect knowledge.

## **FAMILY 3: ENVIRONMENTAL CONCERNS**

### ***3.1 Environmental concerns related to vehicle use and ownership (in general and for the individual/household)***

- Definition: Any statements that relate to whether or not the speaker is concerned about how vehicle use (whether in general, or their own) impacts the environment
- Examples: I worry about how cars pollutes the air; I drive a lot of miles, and I know that's not good for the environment.
- Inclusions: Include statements where the speaker mentions NOT being concerned, as well as those statements expressing concern.
- Exclusions: Do not include statements that describe a link between vehicle use and the environment but do not express any sentiment about whether or not that is a problem.
- Analysis: This information will help us to understand the extent and nature of the participants' concerns about vehicles and the environment. This will, in turn, help us to determine consistency/inconsistency between these attitudes and choices about vehicles and driving.

## **FAMILY 4: ENVIRONMENTAL ACTIONS: ACTUAL AND POTENTIAL**

### ***4.1 Environmental actions***

- Definitions: Actions related to either vehicle purchase or use that the participants take to reduce their environmental impact.
- Examples: Keep tires inflated, choose to purchase a vehicle with a smaller engine or better gas mileage within the desired class, replace vehicle trips with other modes; “of the size that I needed and the money that I had to spend, I balanced that with what I could get that was environmentally friendly.”
- Analysis: This code is a key to identifying conscious actions that the participants feel they have taken to align their environmental beliefs with their actions.

### ***4.2 Factors that would encourage purchase of environmentally-friendly vehicles***

- Definitions: Anything that the participants say might encourage them to purchase environmentally-friendly vehicles.
- Examples: Getting more trustworthy and complete information; if car salespeople discussed this; “viable” purchase options (reliable, affordable).
- Analysis: Will help us to pinpoint what constraints the participants believe prevent them from aligning their environmental values with their actions.

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## **FAMILY 5: ATTITUDES/BEHAVIOR CONSISTENCY (ABC)**

NOTE: this section relates to participants' comments regarding their ability to act on their environmental concern, behaviors or choices that make it undesirable, inconvenient, difficult or impossible to make vehicle ownership and use choices that have smaller environmental impacts.

### **5.1 Constraints, perceived and objective**

- Definition: Comments related to the barriers participants perceive to owning “greener” vehicles (higher fuel efficiency, lower emissions, smaller, less consumptive vehicles). This code includes the large number of comments explaining why participants haven't purchased hybrid vehicles, like the Toyota Prius.
- Examples: “it'd be nice to have one [a Prius], if you could afford it”; “unfortunately for my situation... I couldn't make any changes”; feeling that hybrids are still untested technology; belief that battery replacement costs are inevitable and high.
- Analysis: These statements will help identify the difficulties participants identify in buying greener vehicles or in driving fewer miles or less frequently. Will help us to pinpoint what constraints the participants believe prevent them from aligning their environmental values with their actions.

### **5.2 Habits**

- Definition: Comments related to behaviors participants feel are habitual.
- Examples: “But we lived the same way for so long, it's kind of hard to just make that change”; “Since I already had a Camry that was uh... a six cylinder, I decided to pick another Camry.”
- Analysis: These comments will help us identify behaviors that participants engage in automatically and without conscious consideration. Habits can deter people from behaving in environmentally friendlier ways (taking transit, riding bicycles or walking, driving less frequently or fewer miles), acting as a constraint that, at times, is more perception than objective.

### **5.3 Compensating behavior**

- Definition: Comments explaining behaviors that participants believe replace or compensate for actions they do not take (like buying a hybrid vehicle, or taking transit instead of driving, or replacing a gas-guzzler vehicle with a greener vehicle).
- Examples: “I'll recycle, I'll pay extra for electricity, um... I'll sign up for whatever green SMUD thing that they have... (so she can drive her larger, safer car)”; “I only drive it and only really on the weekends so I feel like maybe that kind of balances it out.”
- Analysis: These comments will help us assess how participants define environmental actions and how they compare or equate one type of action to others.

### **5.4 Efficacy**

- Definition: Comments related to participants' sense of effectiveness in addressing

problems or challenges. In some cases, the comments will reflect a sense of hopelessness or inability to have a positive effect, in others they will reflect a strong feeling of accomplishment or ability to make positive changes.

- Examples: “no matter what car I drive, you contribute into the environment being bad”; “but I don’t know if anybody can come up with a true answer because to... to... to...um...fix it because there’s too much politics and money involved in...in... maintaining this lifestyle.”
- Analysis: A sense of inability to affect a problem can discourage action or behaviors that reduce the environmental impact of owning and using vehicles, and thus functions as a constraint to environmentally responsible behaviors and decisions. This code will help us assess the extent to which feelings about efficacy are important in explaining levels of attitudes-behavior consistency.

## **FAMILY 6: OTHER CODING**

### ***6.1 Vehicle purchase information***

- Definition: Comments related to the sources of information vehicle buyers used in making a decision.
- Examples: Online sources (edmunds.com, Kelly Blue Book, etc.), friends, family members, salespeople, news reports, etc.
- Analysis: These statements will help identify how and from whom vehicle buyers obtain information about the qualities and attributes of vehicles. It may be possible to association types of information sources with specific decisions.

### ***6.2 Vehicle purchase decisionmakers***

- Definition: Comments related to who is involved in the vehicle purchase decision within participants' households.
- Examples: Individual participant only, individual participant with the involvement of another family member (spouse, parent, child), other family member without individual participants involvement.
- Analysis: Will allow us to assess how many people are involved in vehicle purchase decision-making and, perhaps, to identify patterns in # and types of people involved in decisions and the types of vehicles purchased.

### ***6.3 Gas price hike response***

- Definition: Comments related to the changes (if any) that participants made in their driving behavior during the summer and fall of 2008 when gasoline prices rose to over \$4.00 a gallon.
- Examples: started carpooling, replaced some drive trips with bus trips.
- Analysis: Will allow a qualitative assessment of behavioral changes related to a substantial and relatively rapid rise in fuel prices. Could be indicative of behavioral changes that are acceptable (even if undesirable) and of the effects of changing a habitual form of behavior.

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## ENDNOTES

1. We use the term “sustainable vehicle” in this report to indicate passenger cars and light duty trucks that are more fuel efficient and less polluting than the average passenger vehicle sold in the United States, recognizing that Toyota Priuses, Honda Fits, Ford Focuses and other vehicles we designate “sustainable” still cause significant environmental impacts in their manufacture, operation, and eventual disposal.
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3. Dennis Jacobs, “Half of Public Favors the Environment over Growth,” <http://www.gallup.com/poll/105715/Half-Public-Favors-Environment-Over-Growth.aspx>, accessed July 10, 2008; Willett Kempton, James S. Boster, and Jennifer A. Hartley, *Environmental Values in American Culture*, 1995.
4. See Charles A. Lave and Kenneth Train, “A Disaggregate Model of Auto-Type Choice,” *Transportation Research Part A: General* 13(1), 1979: 1–9; Michael Murtaugh and Hugh Gladwin, “A Hierarchical Decision-Process Model for Forecasting Automobile Type-Choice,” *Transportation Research Part A: General* 14(5-6), 1980: 337–347. More recent studies to use this approach include Xinyu Cao, Patricia L. Mokhtarian, and Susan L. Handy, “Neighborhood Design and Vehicle Type Choice: Evidence from Northern California,” *Transportation Research Part D* 11, 2006: 133–145; Pnina O. Plaut, “The Uses and Users of Suvs and Light Trucks in Commuting,” *Transportation Research Part D* 9, 2004: 175–83.
5. See, for example, Sangho Choo and Patricia L. Mokhtarian, “What Type of Vehicle Do People Drive? The Role of Attitude and Lifestyle in Influencing Vehicle Type Choice,” *Transportation Research Part A* 38(3), 2004: 201–222; Ryuichi Kitamura, Patricia L. Mokhtarian, and Laura Laidet, “A Micro-Analysis of Land Use and Travel in Five Neighborhoods in the San Francisco Bay Area,” *Transportation* 24(2), 1997: 124–158; Linda Steg, Karst Geurs, and Michiel Ras, “The Effects of Motivational Factors on Car Use: A Multidisciplinary Modelling Approach,” *Transportation Research Part A: Policy and Practice* 35(9), 2001: 789–806.
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8. Birgitta Gatersleben, Linda Steg, and Charles Vlek, “Measurement and Determinants of Environmentally Significant Consumer Behavior,” *Environment and Behavior* 34(3), 2002: 335–362; Kaiser, Wolfing, and Fuhrer, “Environmental Attitude and Ecological Behaviour”; Maria Nilsson and Rikard Küller, “Travel Behaviour and Environmental Concern,” *Transportation Research Part D* 5(3), 2000: 211–234; Caroline Lundquist Noblet, Mario F. Teisl, and Jonathan Rubin, “Factors Affecting Consumer Assessment of Eco-Labeled Vehicles,” *Transportation Research Part D* 11(6), 2006: 422.
  9. Bradley Flamm, “The Impacts of Environmental Knowledge and Attitudes on Vehicle Ownership and Use,” *Transportation Research Part D: Transport and Environment* 14(4), 2009: 272–279; Nilsson and Küller, “Travel Behaviour and Environmental Concern”; Anaïs Rocci, “De l’automobilité à la Multimodalité? Analyse Sociologique des Freins et Leviers au Changement de Comportements vers une Réduction de l’usage de la Voiture: Le Cas de la Région Parisienne et Perspective Internationale.” Université de Paris 5– René Descartes, Sorbonne, 2007.
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  11. Henk Aarts and Ap Dijksterhuis, “The Automatic Activation of Goal-Directed Behaviour: The Case of Travel Habit,” *Journal of Environmental Psychology* 20(1), 2000: 75–82; Bas Verplanken, Henk Aarts, and Ad van Knippenberg, “Habit, Information Acquisition, and the Process of Making Travel Mode Choices,” *European Journal of Social Psychology* 27(5), 1997: 539–560.
  12. Leesa Bonniface and Nadine Henley, “‘A Drop in the Bucket’: Collective Efficacy Perceptions and Environmental Behavior,” *Australian Journal of Social Issues* 43(3), 2008: 345–58.
  13. O’Fallon, Sullivan, and Hensher, “Constraints Affecting Mode Choice by Morning Car Commuters”; Carmen Tanner, “Constraints on Environmental Behavior,” *Journal of Environmental Psychology* 19, 1999: 145–57; Glenda Wall, “Barriers to Individual Environmental Action: The Influence of Attitudes and Social Experiences,” *The Canadian Review of Sociology and Anthropology* 32, 1995: 465–489.



14. Kelly J. Clifton and Susan L. Handy, "Qualitative Methods in Travel Behaviour Research," in *Transport Survey Quality and Innovation*, ed. D. Jones and P. Stopher (Oxford, UK: Elsevier, 2003); Reid R. Heffner, Kenneth S. Kurani, and Thomas S. Turrentine, "Symbolism in California's Early Market for Hybrid Electric Vehicles," *Transportation Research Part D: Transport and Environment* 12: 2007: 396–413; Sandra Rosenbloom, "How Adult Children in the UK and the US View the Driving Cessation of Their Parents: Is a Policy Window Opening?" *Journal of Transport Geography*, In Press.
15. David L. Morgan, *Focus Groups as Qualitative Research*, 1997.
16. The focus group discussion guide included an additional topic—the extent to which the spring and summer 2008 gasoline price spike affected travel behavior. We have not included details of the short discussions that covered this topic because of our focus on vehicle ownership in this report.
17. Flamm, "The Impacts of Environmental Knowledge and Attitudes on Vehicle Ownership and Use."
18. The list was purchased from the direct marketing firm Accudata Integrated Marketing (<http://www.accudata.com>) and included all households for which telephone numbers were publicly accessible.
19. People who disagreed with the statement "We must protect the environment, even if it means paying higher prices for gasoline and electricity" would be less likely to feel a sense of inconsistency with their vehicle ownership and use decisions because few people actively desire to harm the natural environment (in which case, owning a sustainable vehicle would be at odds with their attitudes). Those without pro-environmental attitudes might still own sustainable vehicles in equal or greater numbers than people with pro-environmental attitudes, however, and there are interesting possibilities for study here that we were not able to explore in this series of focus groups.
20. Participants were aware of the presence of the researchers and agreed to having the sessions recorded for later analysis. The San José State University Institutional Review Board approved the process taking to protect the participants' confidentiality.
21. Asha Weinstein Agrawal, Jennifer Dill, and Hilary Nixon, *"Green" Transportation Taxes and Fees: A Survey of Californians* (San José, CA: Mineta Transportation Institute, 2009); Jacobs, "Half of Public Favors the Environment over Growth"; Kempton, Boster, and Hartley, *Environmental Values in American Culture*.
22. Many participants perceived of important limits to the choices they would make to compensate for the environmental impacts of their vehicles. Though a few said, for example, that taking transit was one way in which they tried to reduce the use, and thus the environmental impacts, of their cars and light duty trucks, many more described the Sacramento region's transit system as so unsafe, insufficient, and

inconvenient that they would not use it and would discourage their family and friends from doing so. This attitude becomes a constraints to their travel options and, thus, affects vehicle ownership decisions.

23. Current legislation only addresses low-mileage cars (not light or heavy duty trucks) and the combined miles-per-gallon threshold has not been increased since passage of the Energy Tax Act of 1978. Including light duty trucks and raising the gas-guzzler thresholds as fuel economy standards rise for all vehicles will provide financial incentives to car and truck buyers to choose more sustainable vehicles.

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## ABBREVIATIONS AND ACRONYMS

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EPA	Environmental Protection Agency
GHG	Greenhouse Gas
MTI	Mineta Transportation Institute
SMUD	Sacramento Municipal Utility District
SULEV-II	Super Ultra Low Emissions Vehicle
SUV	Sport-Utility Vehicle

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