Final Report
Strategies for Energy Efficiencies in Transportation ("SEET")

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The contents of the report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of Hawai‘i, Department of Transportation or of the U.S. Department of Transportation Federal Highway Administration. This report does not constitute a standard, specification or regulation.

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Executive Summary

This study surveyed a representative sample of 1,536 adult residents in the four counties of the State of Hawai‘i to understand their attitudes and behaviors and to gauge their preferences for and sensitivities to various energy-efficiency strategies in transportation. More specifically, the study asked the following questions:

- ✓To what extent did high fuel prices in the past affect travel behavior?

- ✓Will higher fuel prices in the future spur: (a) purchase of smaller and/or fuel-efficient and/or alternative fuel vehicles; (b) greater use of alternative modes of motorized (e.g., fixed guideway, city buses, motor bikes, carpools and vanpools) and non-motorized (e.g., bicycles, walking) travel; and (c) adjustments in lifestyle and daily travel behavior (e.g., four-day work week, telecommuting, mixed-use, high density community living)?

The findings and recommendations are:

<u>Gas Prices and Travel Behavior</u>
The 2008 rise in gasoline prices had a notable effect on consumer behavior; with nearly half of Hawai‘i’s residents stating that they drove fewer miles and over half taking specific measures to cope with the higher gas prices. The most-used coping measure was to be more efficient in their travel, i.e., combining errands in one trip /consolidating trips. These and other adopted changes continued even after prices declined, pointing to the possibility of using price incentives to effect behavior changes. One possibility is to establish a “price floor” on gasoline throughout the state, where gasoline prices and consumer behavior could drive an optimal gas tax rate, with revenues set aside for energy-related purposes.

<u>Vehicle Use, Ownership, and Purchase</u>
Although surveyed during a period of economic recession in Hawai‘i and the globe, nearly 30% of the respondents expect to acquire a vehicle within the next three years; and, of those, two-thirds expressed interest in a hybrid vehicle. Among the incentives persuading them to purchase hybrid vehicles are: higher gas prices (particularly if the price rose to $5.00 per gallon), more cash for their trade-in vehicle, a tax credit, free or preferential parking at work, and access to high-occupancy vehicle lanes.

<u>Clean Fuels</u>
Fuel economy was the number one priority in selecting a new vehicle (“safety” being the second). As such, respondents were open to fuel efficient technologies such as hybrid gas-electric vehicles as well as fuel switching, particularly to biodiesel. More than half of the respondents were familiar with biodiesel and ethanol fuels; and almost half would consider buying or leasing a vehicle that is able to run mainly on biodiesel or ethanol, with biodiesel tending to be preferred over ethanol.

Public Transit

Nearly one-fifth (18.2%) of the respondents rode the bus the previous week, but a large segment seems to be unwilling to take public transit in its present form. Bus transit is an important mode of transportation for the state; and, when asked what would encourage ridership, respondents suggested making service more accessible – with convenient bus stops and more frequent service. Almost one in four (23.0%) commuters who pay for parking statewide would take the bus if the cost of parking doubled.

Preferred Lifestyle Adjustments

The survey results point to the willingness of residents to make trade-offs to achieve a shorter commute time. The survey shows that a substantial percentage of residents are likely to accept living in places that have attributes of what is commonly referred to as transit-oriented development (TOD) to achieve a shorter commute from home to work or school. Residents particularly want more convenient access to neighborhood stores and services, ability to use non-motorized travel (walking or bicycling), and family-friendly public spaces. If TOD is well-planned and designed, some residents are also likely to accept the idea of living in smaller homes in more densely-settled areas. Local land-use planning and zoning laws should thus encourage and foster this type of development, and focus some of those efforts on 'smart growth' and in-fill development within existing urban areas. Those efforts would contribute toward the broader goal of achieving greater energy efficiency in the surface transportation system.

Exemplary Policies from Other Jurisdictions

The study also provides various exemplary policies at the state and federal level relevant to increasing use of clean vehicles and clean fuels; encouraging lifestyle adjustments such as smart growth development; and promoting public transit use.

Future Applications and Next Steps

Policy implications from the survey findings and the data from a random representative sample of statewide residents are important in achieving energy-efficient ground transportation. It should be highlighted that there is also tremendous value in the raw data from a randomly selected representative sample of Hawai'i residents. For example, based on respondent reports, the estimated vehicle miles traveled (VMT) per person for 2008 averaged 10,300. This figure exceeds the 2008 state VMT estimate by vehicle of 9,059, as reported in the Hawai'i State Data Book. The 13.7% difference in estimates suggests the need to collect information on *actual* vehicle miles traveled within the state. As important is the need to obtain (1) a larger sample, including mobile phone users; and (2) over time to identify potential policies and programs and their impact.

The data obtained through the survey, when combined with other state and local data, can be used to test the various recommended policies and enable coordinated policy planning and development to achieve the energy independence goals of the state.

Introduction and Background

A major consideration in the metropolitan transportation planning process is energy conservation. In the recent past, this issue has been at the forefront of the public mind. With the continuing volatility of gasoline prices (an increase of almost 25% statewide during the first half of 2008,[1] followed by a rapid decline during the second half of the year), Hawai'i's substantial reliance on imported fossil fuel for both internal combustion and electrical power makes the state highly vulnerable to market forces outside of its control. Some energy analysts recognize that demand for oil will exceed supply in the next few years, especially from developing nations such as China and India. If their predictions are correct, gas prices could reach $7.00 a gallon by 2012.[2] At that point, the issues of energy conservation and alternatives to fossil fuel will become more critical.

Hawai'i's heavy dependence on imported fossil fuel has been of grave concern. In 2005, about 62% of the petroleum used in the state was for transportation and of that amount, 71% was for ground transportation.[3] Back then Hawai'i consumed about 525 million gallons of gasoline and diesel for ground transportation, with nearly all of the gasoline and diesel refined from imported petroleum.[4] With gasoline currently selling for about $3.40 a gallon, this level of consumption represents a cost of almost $1.79 billion a year.

Background

The Governor of Hawai'i helped to address these concerns on July 5, 2007 by approving Act 254 on July 5, 2007. The act authorized a study on energy-efficient transportation strategies to reduce fuel demand in Hawai'i's transportation sector, and in so doing, reducing Hawai'i's dependence on imported fossil fuel. It tasked the Hawai'i Energy Policy Forum ("HEPF" or "Forum") at the University of Hawai'i at Mānoa to conduct a study in cooperation with the Hawai'i State Department of Business, Economic Development, and Tourism. The HEPF established the Energy Efficiency in Transportation Strategies Working Group ("Working Group"). The Working Group is comprised of representatives from the Hawai'i Department of Transportation ("HDOT"), the Department of Business, Economic Development, and Tourism ("DBEDT"), each county's transportation division, labor organizations, transportation planning organizations, petroleum refineries, and automobile dealers and manufacturers industries (Working Group members are listed on page iii).

The Working Group developed a vision of "an energy-efficient transportation system that integrates effective community input and planning, and offers people of all ages and walks of life flexible options including mass transit, private and public vehicles, and self-powered conveyance in alternative combinations that provide mobility at acceptable cost." What the group lacked were specific data on consumer preferences and behaviors to effect changes that would reduce the consumption of fossil fuel in ground transportation.

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[1] Pang, Gordon Y. K. "Hawai'i gas price sets record at $4.17," *The Honolulu Advertiser*. June 7, 2008, pages A1, A5.
[2] Samuelson. Robert J. "Learning from the oil shock," Newsweek, June 23, 2008, page 39.
[3] Hawai'i State Department of Business, Economic Development & Tourism (2005)
[4] Hawai'i State Department of Business, Economic Development & Tourism (2006)

It was opportune for the state that energy efficiency in transportation is also a priority of the Federal Highway Administration, especially as it relates to climate change and planning.[5] The O'ahu Regional Transportation Plan update, beginning in 2009, also required an assessment of the current and future uses of energy across the transportation sector. Thus to meet the needs of policymakers and transportation planners, the current study sought to survey residents statewide to understand their attitudes and behaviors and to gauge their preferences for and sensitivities to various energy-efficiency strategies in transportation. More specifically, the study sought to obtain primary data to understand the attitudes and behaviors of users of transportation for work, school, and recreational purposes, as well as to understand how they are dealing with the economic impacts of fuel cost increases. It was expected that survey findings would point to recommendations for developing energy-efficient policies and strategies in the transportation sector.

Objectives of the Study

The study surveyed 1,536 adult residents in the four counties of the state on their preferences, attitudes, and behaviors relating to the following questions:

- ✓To what extent did high fuel prices in the past affect travel behavior?

- ✓Will higher fuel prices in the future spur: (a) purchase of smaller and/or fuel-efficient and/or alternative fuel vehicles; (b) greater use of alternative modes of motorized (e.g., fixed guideway, city buses, motor bikes, carpools and vanpools) and non-motorized (e.g., bicycles, walking) travel; and (c) adjustments in lifestyle and daily travel behavior (e.g., four-day work week, telecommuting, mixed-use, high density community living)?[6]

Data obtained would be used to suggest public policies and/or programs that would motivate motorists to: (a) purchase and use more fuel-efficient and/or alternative fuel motor vehicles for personal travel; (b) use more fuel-efficient modes of transportation; and (c) make lifestyle adjustments to reduce transportation-related energy consumption.

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[5] See discussion at http://www.fhwa.dot.gov/hep/climatechange/index.htm.

[6] Recent surveys by two national polling organizations (i.e., the Gallup and Roper polls) and AAA-Hawai'i indicated that substantial percentages of motorists found ways to cope with high gas prices during spring 2008 (Prater, 2008; Saad, 2008; Velazquez, 2008). In Hawai'i, Vorsiono (2008) opined that drivers were near the 'tipping point' in their response to high gas prices, based on anecdotal information. For the present study, we assume (a) that "tipping points" trigger these coping behaviors as gasoline prices rise; and (b) that these "tipping points" vary from one motorist to another.

Overview of the Report

This report summarizes the findings and recommendations on energy-efficient transportation policies, based on the survey of 1,536 adult residents living and traveling in the State of Hawai‘i. Also, it briefly discusses exemplary policies adopted at the federal and state level to further energy-efficient transportation strategies.

The report is organized into the following sections:

1. Introduction and Background;

2. Methodology, which provides the study design and description of the surveys: (1) a telephone interview of a random representative sample and (2) a web-based survey, with some results of the latter reported in the appendix;

3. Data Analysis, which provides a description of the study sample from the telephone interviews;

4. Findings and Recommendations, which provide data and analyses from the telephone interviews and recommendations based on these findings and input from Working Group members to address each of the issue areas: travel behavior; use, ownership and purchase of energy-efficient vehicles; use of alternative fuels; use of public transit; and attitudes on lifestyle adjustments toward higher density and mixed-use “smart growth” development;

5. Exemplary Policies at the State and Federal Level; and

6. Future Applications and Next Steps

Methodology

Study Design

The study was designed to better understand resident preferences toward transportation alternatives and, more specifically, to answer three sets of questions to identify energy-efficient transportation strategies and potential policies and programs to reduce the use of imported fossil fuel in meeting Hawai‘i’s transportation needs:

- ✓On travel attitudes and behaviors: When gasoline prices rose, what transportation options were taken and/or preferred: (a) purchasing a fuel-efficient vehicle; (b) switching to clean alternative fuels; (c) using other modes of travel, e.g. more public transit, motorbikes, car- and vanpools, bicycles and walking, (d) reducing travel, e.g. telecommuting?

- ✓On preferences for and sensitivities to various energy efficiency transportation strategies: What public policies/programs will motivate motorists to purchase and use more fuel-efficient vehicles for personal travel, alternative clean fuels, and more fuel-efficient modes of travel such as buses, car- and vanpools, and bicycles?

- ✓On preferences and attitudes toward lifestyle adjustments: What are motorist attitudes toward lifestyle adjustments such as plans for higher density and mixed-use developments around transit stations of the proposed Honolulu rail transit project?

The SEET project team obtained resident preference data through two methods: (1) a telephone survey of a random representative sample to address preferences and behaviors; and (2) a web-based survey, which included questions identical to the telephone survey questionnaire. The web-based survey used graphic images to illustrate alternative living and commuting environments.[7]

Data were analyzed and findings and recommendations were submitted to the Working Group for further review and discussion to identify feasible policy recommendations and program for energy-efficient transportation strategies and next steps. The SEET project team also researched other jurisdictions to include exemplary models as possible policy options for consideration in developing energy-efficient transportation policies for the state and its four counties.

Survey Questionnaire

Prior to designing the survey questionnaire, the SEET project staff took inventory of policies that potentially could reduce highway fuel consumption in the State of Hawai‘i. A report titled *Energy Effects, Efficiencies, and Prospects for Various Modes of Transportation* by the National

[7] The main body of the report does not include results of the web-survey, because it was based on a convenience sample. An appendix compares results on lifestyle adjustments between the telephone and web-based surveys for respondents on O‘ahu.

Cooperative Highway Research Program[8] indicated that fuel conservation policies could be organized into five categories:

1. Shift traffic to more efficient modes of travel;
2. Increase vehicle load factors;
3. Reduce travel demand;
4. Increase motor vehicle energy conversion efficiency; and
5. Improve travel usage patterns.

The initial inventory of specific policies under each category was based on federal guidelines to reduce energy consumption in the transportation sector. Our review of the literature indicated that these guidelines were first issued by the U.S. Department of Transportation and periodically updated and refined in published reports.[9] This literature indicated that there are literally scores of highway fuel conservation policies, as well as criteria for evaluating them.[10,11,12,13]

The literature indicated three guiding principles for designing the survey. The first principle is to consider both incentives and disincentives that reinforce each other in their ability to conserve highway fuel. Second, if the public perceives an energy-inefficient transportation mode becoming less attractive, it should also perceive a more efficient mode of transportation becoming increasingly desirable. The third principle is that travel options should not be closed

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[8] NCHRP: National Cooperative Highway Research Program. 1977. *Energy Effects, Efficiencies, and Prospects for Various Modes of Transportation*, National Cooperative Highway Research Program Synthesis of Highway Practice, Report No. 43, Transportation Research Board, Washington, D.C

[9] Publications include:

- A. M. Voorhees and Associates. 1974. Guidelines to Reduce Energy Consumption through Transportation Actions. Urban Mass Transportation Administration, U.S. Department of Transportation, Washington, D.C.
- APERC: Asia Pacific Energy Research Centre. 2007. Urban Transport Energy Use in the APEC Region: Trends and Options. Institute of Energy Economics, Japan.
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- Sperling, Daniel and Susan A. Shaheen, editors. 1995. *Transportation and Energy: Strategies for a Sustainable Transportation System*, American Council for an Energy-Efficient Economy, Washington, D.C.

[10] Cambridge Systematics, Inc. 2009. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*. Urban Land Institute, Washington, D.C.

[11] Flachsbart, Peter G. 1979. Evaluating motor fuel conservation policies at the community level," *Traffic Quarterly* 33 (3): 397-412.

[12] Kulash, Damian. 1978. Energy Efficiency: Which Modes, Which Programs? *Transportation & Energy*, American Society of Civil Engineers, New York, NY, pp. 34-56.

[13] Downs, Anthony. 2004. *Still Stuck in Traffic: Coping with Peak-Hour Traffic Congestion*. Brookings Institution Press, Washington, D.C.

off entirely so as to curtail freedom of choice and economic activity. These three principles helped to identify questions for the survey instrument.

The design of the survey instrument was also based on several assumptions about how motorists would react to higher gasoline prices in the future. The literature review indicated that motorists are likely to cope differently to higher prices, depending on whether high prices can be sustained over a short, medium or long-term. In the short-term, most commuters will continue to use motor vehicles and simply pay higher prices if they expect price shifts to be temporary. Nevertheless, higher gas prices, even in the short-term, may motivate some motorists who are sensitive to price shifts to make greater use of carpools, vanpools, buses, bicycles, and walking for some types of trips. Also, if gas prices spiked in the short term, motorists could be expected to reduce the total number or length of their trips, do more trip-chaining (e.g., do more things in one loop), and/or reduce discretionary spending to make ends meet.

If gas prices remained high for several months, the study assumed that some consumers would begin to (a) purchase vehicles that had substantially better fuel economy than their present vehicle; and/or (b) reduce the number and length of fixed or obligatory trips. The former reaction suggests that public policies should try to offset the higher price tag of more fuel-efficient vehicles. If motorists faced high gas prices beyond several months, the study assumed that some motorists might (a) change the location of where they live, work and/or attend school to substantially reduce weekly travel distances; and/or (b) develop an interest in living along a high-performance bus or rail transit corridor. These latter reactions to high gas prices have implications for land-use planning and public transit investments at the state and county level that could be explored through a survey of the public.

The telephone survey instrument was designed to measure consumer values, attitudes, behaviors, and preferences relating to energy use in ground transportation, which included all modes of transportation, i.e., public and private carriers, motorized and non-motorized (e.g., bicycle, pedestrian) modes of travel, existing technologies of travel (e.g., use of gasoline and diesel vehicles) as well as new technologies (e.g., electric vehicles) that may exist in the State of Hawai‘i in the near future. The initial draft of the questionnaire included a wide variety of questions that were based on recent large-scale national polls on energy issues, as posted by PollingReport.com, and by other studies.[14,15,16] An early draft of the questionnaire was distributed to the Working Group and the HEPF Steering Committee for comments and their suggestions were incorporated into the final questionnaire wherever possible. The final version of the questionnaire was purposely designed to take about 20 minutes on average (the actual length of any given interview varied greatly, depending on responses that triggered additional follow-up questions). The final survey instrument included four sets of questions on these topics: (1) the eligibility of the respondent to take the survey; (2) his or her existing vehicle ownership and travel behavior; (3) preferences for future vehicle ownership, travel behavior and lifestyle

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[14] Baldassare, Mark. 2002. PPIC Statewide Survey: Special Survey on Land Use. Public Policy Institute of California, November.

[15] Belden Russonello & Steward Research and Communications. 2004. *American Community Survey, National Survey on Communities*. Washington, D.C., October.

[16] Kubik, M. *2006. Consumer Views on Transportation and Energy, Third Edition* National Renewable Energy Laboratory Technical Report NREL/TP-620-39047, Golden, Colorado, January.

adjustments based on the assumption that gas prices would rise and stay above four dollars ($4.00) a gallon; and (4) demographic characteristics of the respondent. See Appendix 1 for a copy of the telephone survey instrument.

Data Collection: Telephone Survey

Market Trends Pacific, Inc. (MTP) was contracted to conduct the telephone survey on a random representative sample of adult residents statewide to provide valid and reliable data with a precision of ±3.2% at the 95% significance level.[17]

The RDD (Random Digit Dialing) sample was obtained from a reputable nationwide vendor and purged for nonworking, government, and business listings. Listed white page names for residential telephone sample numbers were provided and used where available to facilitate survey response from households. The telephone survey sample included landline phones only because the budget was not sufficient to include the expense of contacting cellular phone numbers. Telephone interviews were conducted from June 23, 2009 to August 5, 2009 from 2:00 p.m. to 9:00 p.m. Up to 10 follow-up calls were made to working residential numbers to maximize response to the telephone survey.

Respondents were screened to include adult residents, 18 years of age or older and living in Hawai‘i at least six months out of a year, who made a least one trip from home to a destination on their island within the past week. A “trip” was defined as traveling by any mode of transportation, including walking. The average length of the interview was about 15 minutes, and ranged from a high of 42 minutes to a low of four minutes. Of all those who were contacted, only 8% refused to complete the survey.

Table 1 displays the telephone survey design, including sample sizes and calculated sample precisions for each county and the state. The disproportionate sample design ensured that results could be reported for each county with a precision that ranged from ± 4.9 to ± 5.1 percentage points.[18] The estimated overall sample precision for the state was ± 3.2 percentage points.

Table 1: Sample Design for the 2009 Telephone Survey of Trip-Makers

	Population 18+	%	Number	Precision[2/]
Honolulu County	704,243	71.0	401	4.9
Hawai'i County	130,886	13.2	382	5.0
Maui County [1/]	108,740	11.0	380	5.0
Kauai County	48,054	4.8	373	5.1
Total for State of Hawai'i	991,923	100.0	1,536	3.2

[1/] Includes Kalawao County
[2/] Plus and minus percentage points at the 95% confidence level
Source: Estimate of Population Ages 18+: Profile of General Demographic Characteristics, 2005-2007 American Community Survey 3-Year Estimates

[17] Specific services provided by MTP included 1) creating a CATI version of a telephone survey instrument and programming a web version of an Internet questionnaire; 2) preparing all training materials; 3) hiring, training and staffing; 4) sample generation; 5) pre-testing the telephone and web survey questionnaires; 6) revising the survey instruments; 6) completing 1,536 telephone interviews statewide; and 7) processing and tabulating all data.
[18] 95% confidence level, assuming a theoretical survey result of 50%

Data Weighting of the Survey Sample

A comparison of telephone survey demographic results with population statistics based on 2005-2007 Three-Year Estimates from the American Community Survey of the U.S. Census for the State of Hawaii by County resulted in a decision to weight the results of the telephone survey so that they conformed to population distributions for three variables: respondent's county of residence, age, and gender to enable the sample to better reflect the demographic composition of the state. The survey demographics were also compared by ethnicity and income, and appeared to be reasonably comparable to population values and therefore did not require an adjustment through weighting.[19] It should thus be noted that the distributions for non-weighted variables, such as education, income and ethnicity, are not expected to be exactly the same as the population estimates.

Table 2 shows the age and gender population distributions used to weight the telephone survey sample. The sample was weighted to conform to the distribution of age and gender categories as reported by the 2005-2007 American Community Survey Three-Year Estimates of the U.S. In the weighting process, the count for each category of each county's age distribution was allotted in proportion to the overall gender (male and female) distribution for that county. Population estimates for each county-age-gender combination were divided by actual sample counts to obtain sample weights.[20,] The overall weighted total for the state was adjusted so that the total weighted sample size was equal to the total unweighted sample size of 1,536.[21]

Table 2: Age and Gender Population Estimates for the State of Hawai'i by County

	Honolulu	Hawai'i	Maui	Kauai
18 and over	704,243	130,886	108,740	48,054
Gender				
Male	351,552	64,775	55,206	23,965
Female	352,691	66,111	53,534	24,089
Age				
18 to 24	93,071	15,953	10,678	4,704
25 to 34	127,609	23,285	20,501	7,872
35 to 44	129,896	21,107	21,514	8,518
45 to 54	123,755	26,653	22,771	10,081
55 to 64	98,900	21,128	16,821	7,806
65 and over	131,012	22,760	16,455	9,073

Source: Profile of General Demographic Characteristics: Profile of General Demographic Characteristics, 2005-2007 American Community Survey 3-Year Estimates

[19] It is important to note that a dataset should not be weighted by more parameters than necessary because it can introduce additional unknown error into survey results. One of the reasons for this is that the importance (weight) of some cases is magnified by the weighting system while the importance (weight) of others can be reduced. The resulting weighted sample suffers some loss of sampling precision (+ or - percentage points at the 95% confidence level) compared to the original, and also includes distortion in unweighted variables that is difficult to estimate.

[20] Weights could not be calculated for cases that did not have information about the respondent's age (age refusals). Such cases are therefore not included in weighted tallies of the survey data.

[21] Note that this is reflected in the total sample size within each summary data table. The weighted data are provided, thus also showing weighted sample size. The implication, therefore, is that while there are relatively small sample sizes for counties with smaller populations, such as Kaua'i, each county is represented with the same statistical confidence (± 5% error at the 95% significance level).

The weights ensure that the overall age and gender distributions for the sample exactly match the population parameters from the 2005-2007 American Community Survey. The exact weight calculated to the sixth decimal point was used in all weighted calculations. The SPSS statistical program used to weight the sample takes each case and multiplies it by a decimal fraction weight. The resulting numbers are thus decimal fractions, which are used to calculate the percentages. After calculation using weights, the SPSS statistical program rounded numerical estimates to the nearest whole number and percent estimates to the nearest one tenth. Thus, in some of the tables shown later, the percentages derived from similar numbers may have different values even though the rounded numbers appear to be identical. Inconsistencies in numbers are thus due to weighting, and so noted on the tables.

Given the constraints of telephone-based survey research and the above-cited data adjustments, it is reasonable to assert that the telephone survey sample data are reflective of the population of the State of Hawai‘i (with a precision of ± 3.2% at the 95% confidence interval).

Data Collection: Web Survey

In addition to the telephone survey, the SEET project team and MTP developed a web survey that was identical in content, but not in format, to the telephone survey. The web survey enabled use of seven visual images to illustrate alternative living and commuting environments in several questions geared to determine preferences for attributes of transit-oriented development, which is a principle of ‘smart growth.’ The SEET project team selected these images from a large inventory of photo-realistic computer images sold by Urban Advantage of Berkeley, California. The web survey also sought to spur interest in transportation energy issues by encouraging input from a younger demographic that may not have been contacted by the telephone survey, as it was restricted to only landline phone numbers. Refer to Appendix 2 for the web survey instrument and to Appendix 3 for a description of efforts to promote the web survey.

Because web respondents were self-selected, they do not represent a random sample of the general population. Therefore, the web-based data and results are not presented in the report itself with one exception. Some results on lifestyle adjustments and attitudes toward Honolulu’s planned rail transit project from the web-based survey are compared with results on these questions from the telephone survey in Appendix 5.

Data Analysis

The data used for developing policy recommendations are based on responses from a statewide random sample of residents interviewed by phone during the summer of 2009. A web survey was also conducted to obtain information from a broader cross-section of the population that may not have been included in the landline sample. People who participated in the web survey do not represent a random sample. This special self-selected sample provided some insights on energy use and attitudes but was not used in developing recommendations.[22] As noted in the methodology section, the telephone survey was based only on households with landline phones.

This section includes a description of the telephone survey sample. Some tables in this report are based on a subset of the total sample that answered the particular question on which the table is based. These tables identify the subset of the total sample at the foot of that table.

Residence: Type of Dwelling, Length of Residence, and Location

As a result of calling households with landline phones (a common survey bias due to the cost and limited access of cellular phone surveys), Table 3 shows that most respondents tended to live in single-family homes (75.1%), and Table 4 shows that most are long-time residents of the state (69.3% living in Hawai‘i for 20 years or more, including those who said all my life).

Table 3: Present Dwelling Arrangement

	Number	%
Single-family detached house	1,153	75.1%
Townhouse	107	7.0%
Condominium	100	6.5%
Apartment	127	8.3%
Another type of dwelling	47	3.1%
Don’t know/Refused	2	0.1%
Total	1536	100.0%

[22] Compared to the general state population, the self-selected respondents in the web survey were more educated (three-fourths of the web respondents had a college degree and 44% had attained a post-graduate degree). They also evidenced noticeably different reactions to key transportation energy issues: Two-thirds reported taking some action the previous year to cope with higher gasoline prices, compared to fewer than 57% of the weighted random sample telephone survey respondents; and 80% said they were very or somewhat likely to buy a hybrid gas-electric vehicle when they bought or leased their next vehicle, compared to fewer than two thirds of the weighted random telephone respondents. Because the online web respondents were a special self-selected population and not a random sample of the general population, no weighting was applied to the web sample, and results were tabulated separately from the RDD telephone sample.

Table 4: Number of Years Living in Hawai'i

	Number	%
Less than a year	24	1.6%
One to four years	110	7.2%
Five to nine years	136	8.9%
10 to 19 years	197	12.8%
20 years or more	1065	69.3%
Don't know/refused	4	0.3%
Total	1536	100.0%

Table 5 shows the weighted primary residential distribution of the respondents, with 71.0% from Oahu, which also includes the district distribution (based on zip code)[23], followed by Hawai'i County (13.2%), Maui County (11.0%), and Kaua'i County (4.8%).

Table 5: Location of Residence

	Number	% Total (State)	% Honolulu
City & County of Honolulu	1,091	71.0%	100.0%
East Honolulu	78		19.5%
Central Honolulu	36		9.0%
West Honolulu	75		18.7%
Windward	48		12.0%
Leeward	96		23.9%
Central / North Shore	55		13.7%
O'ahu unidentified	13		3.2%
Hawai'i County	203	13.2%	n/a
Maui County	168	11.0%	n/a
Kaua'i County	74	4.8%	n/a
Total	1,536	100.0%	100.0%

Household: Size, Children under 18 Years, and Family Income

Table 6 shows that the typical (median) respondent household has three members.

Table 6: Number of People Living in Household

	Number	%
1	223	14.5%
2	405	26.3%
3	297	19.3%
4	306	19.9%
5	170	11.1%
6 or more	131	8.6%
Don't know/Refused	4	0.3%
Total	1,536	100.0%

Table 7 reveals that over half of the households (58.3%) have no children under the age of 18.

[23] Appendix 4 provides a chart of the zip codes represented by the residential districts in the City and County of Honolulu.

Table 7: Number of Households with Children under 18

	Number	%
None	896	58.3%
1	261	17.0%
2	246	16.0%
3 or more	129	8.4%
Don't know/Refused	4	0.3%
Total	1,536	100.0%

The estimated statewide median family income (before taxes) of respondents was $55,100, with Honolulu at $59,500 for Honolulu, followed by Kaua‘i ($48,900), Maui ($46,200) and Hawai‘i ($45,600). See Table 8 for the sample distribution of family incomes for the state.

Table 8: Family income

	Total		Honolulu		Hawai‘i		Maui		Kauai	
	Number	%	Number	%	Number	%	Number	%	Number	%
Less than $25,000	198	12.9%	130	11.9%	35	17.2%	26	15.6%	6	8.6%
$25,000 but less than $35,000	102	6.6%	58	5.3%	21	10.4%	16	9.4%	7	9.6%
$35,000 but less than $50,000	214	13.9%	151	13.8%	30	14.9%	22	13.0%	11	14.6%
$50,000 but less than $75,000	209	13.6%	152	14.0%	35	17.1%	15	8.8%	7	9.7%
$75,000 but less than $100,000	167	10.9%	121	11.1%	18	9.1%	19	11.5%	8	11.1%
$100,000 or over	223	14.5%	182	16.6%	16	7.7%	19	11.2%	7	9.8%
Don't know	195	12.7%	152	14.0%	18	8.8%	17	10.2%	8	10.3%
Refused	229	14.9%	145	13.3%	30	14.9%	34	20.3%	20	26.3%
Total	1,536	100.0%	1,091	100.0%	203	100.0%	168	100.0%	74	100.0%
Estimated median family income	$55,100		$59,500		$45,600		$46,200		$48,900	

Ethnicity, Education, and Employment

Table 9 shows the predominant ethnicity among respondents is Caucasian (27.9%), followed by Hawaiian or Part Hawaiian (14.1%), and Japanese (12.4%). It also shows the distribution across the counties.

Table 9: Ethnicity

	Total		Honolulu		Hawai‘i		Maui		Kaua‘i	
	Number	%	Number	%	Number	%	Number	%	Number	%
Caucasian	428	27.9%	281	25.8%	70	34.5%	55	32.7%	23	31.1%
Chinese	83	5.4%	79	7.2%	1	0.5%	1	0.6%	1	1.4%
Filipino	167	10.9%	112	10.3%	17	8.4%	23	13.7%	14	18.9%
Hawaiian/Part-Hawaiian	217	14.1%	136	12.5%	47	23.2%	24	14.3%	9	12.2%
Japanese	191	12.4%	148	13.6%	16	7.9%	18	10.7%	9	12.2%
Korean	28	1.8%	27	2.5%	0	0.0%	0	0.0%	0	0.0%
African American	17	1.1%	12	1.1%	3	1.5%	1	0.6%	0	0.0%
Other	207	13.5%	145	13.3%	29	14.3%	26	15.5%	8	10.8%
Mixed (not Hawaiian)	143	9.3%	119	10.9%	11	5.4%	10	6.0%	3	4.1%
Don't know/Refused	55	3.6%	31	2.8%	7	3.4%	10	6.0%	7	9.5%
Total	1,536	100.0%	1,091	100.0%	203	100.0%	168	100.0%	74	100.0%

Over half of respondents (59.7%) have at least some college education (Table 10).

Table 10: Education—Last Grade Completed

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	Number	%	Number	%	Number	%	Number	%	Number	%
Less than high school	66	4.3%	48	4.4%	9	4.4%	6	3.6%	4	5.4%
High school graduate	334	21.7%	226	20.7%	48	23.6%	45	26.8%	14	18.9%
Business/trade school	68	4.4%	39	3.6%	14	6.9%	11	6.5%	4	5.4%
Some college	351	22.9%	263	24.1%	40	19.7%	31	18.5%	17	23.0%
College graduate	430	28.0%	310	28.4%	51	25.1%	47	28.0%	22	29.7%
Post college graduate	136	8.9%	103	9.4%	15	7.4%	12	7.1%	5	6.8%
Don't know/Refused	152	9.9%	102	9.3%	26	12.8%	16	9.5%	8	10.8%
Total	1,536	100.0%	1,091	100.0%	203	100.0%	168	100.0%	74	100.0%

Over half (62.7%) of respondents are employed full or part-time in at least one job. Of those employed, Table 11 shows the primary location of employment. O'ahu residents have also been categorized according to districts.

Table 11: Place of Employment

	Number	%
City & County of Honolulu	705	73.2%
East Honolulu	33	3.4%
Central Honolulu	259	26.9%
West Honolulu	101	10.5%
Windward	28	2.9%
Leeward	64	6.6%
Central / North Shore	25	2.6%
O'ahu unidentified	195	20.2%
Hawai'i County	104	10.8%
Maui County	111	11.5%
Kaua'i County	43	4.5%
Total	963	100.0%

Asked of those who are employed.

Of those employed, one in five employed respondents (20.1%) has more than one job, as shown in Table 12.

Table 12: Respondents Employed in More Than One Job

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	194	20.1%	147	20.9%	17	16.8%	22	19.4%	8	19.0%
No	769	79.9%	558	79.1%	87	83.2%	89	80.3%	35	81.0%
Don't know/Refused	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	963	100.0%	705	100.0%	104	100.0%	111	100.0%	43	100.0%

Asked of those who are employed.

Activities

Respondents were given a list of activities and asked to list any or all activities in which they were engaged during the last week. The majority (62.7%) said they worked full or part-time for pay at a location outside of home and 13.4% worked at home for pay (Table 13). Most people said that they spent much of their time at home (67.4%). It was assumed that these people based their response on a 24-hour time period. Only 8.3% stated that they had attended classes as a full or part-time student in the last week; but it should be noted that the survey was conducted during summer months so this may not be representative of school-year travel patterns.

Table 13: Respondent's Activities During the Last Week

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Work full or part time for pay at a location outside your home										
Yes	963	62.7%	705	64.6%	104	51.5%	111	65.7%	43	58.1%
No	568	37.0%	382	35.0%	98	48.5%	57	33.7%	31	41.9%
Don't know/Refused	5	0.3%	4	0.4%	0	0.0%	1	0.6%	0	0.0%
Total	1,536	100.0%	1,091	100.0%	202	100.0%	169	100.0%	74	100.0%
Attend classes at a school, college or university as a full or part-time student										
Yes	127	8.3%	101	9.3%	15	7.4%	8	4.7%	3	4.1%
No	1,409	91.7%	990	90.7%	187	92.6%	161	95.3%	71	95.9%
Total	1,536	100.0%	1,091	100.0%	202	100.0%	169	100.0%	74	100.0%
Work at home for pay										
Yes	206	13.4%	122	11.2%	40	19.8%	31	18.3%	13	17.6%
No	1,328	86.5%	969	88.8%	161	79.7%	138	81.7%	60	81.1%
Don't know/Refused	2	0.1%	0	0.0%	1	0.5%	0	0.0%	1	1.4%
Total	1,536	100.0%	1,091	100.0%	202	100.0%	169	100.0%	74	100.0%
Keep house and/or take care of children at home										
Yes	636	41.4%	421	38.6%	110	54.5%	74	43.8%	31	41.9%
No	889	57.9%	659	60.4%	92	45.5%	95	56.2%	43	58.1%
Don't know/Refused	10	0.7%	10	0.9%	0	0.0%	0	0.0%	0	0.0%
Total	1,536	100.0%	1,090	100.0%	202	100.0%	169	100.0%	74	100.0%
Take a vacation or trip out of town										
Yes	253	16.5%	158	14.5%	43	21.3%	37	21.9%	15	20.3%
No	1,283	83.5%	933	85.5%	159	78.7%	132	78.1%	59	79.7%
Total	1,536	100.0%	1,091	100.0%	202	100.0%	169	100.0%	74	100.0%
Mainly stayed at home										
Yes	1,035	67.4%	722	66.2%	147	72.8%	117	69.2%	49	66.2%
No	488	31.8%	357	32.7%	54	26.7%	52	30.8%	25	33.8%
Don't know/Refused	13	0.8%	12	1.1%	1	0.5%	0	0.0%	0	0.0%
Total	1,536	100.0%	1,091	100.0%	202	100.0%	169	100.0%	74	100.0%

Findings and Recommendations

This section presents a summary of findings and policy recommendations on transportation options, based on the telephone survey results.[24] Results for the web survey are not included in the report because they were based on a self-selected non-random sample in contrast to the telephone survey's sample, which was obtained using Random Digit Dialing (RDD).

Data were analyzed to provide insight into the major study questions. The findings are the basis of the policy recommendations that follow. These recommendations pertain to: (1) the impact on travel behavior of higher gasoline prices, specifically, if gas prices exceed and remain above $4.00 per gallon; incentives that would motivate motorists to purchase and use (a) more fuel-efficient vehicles for personal travel, (b) alternative fuels, (c) more fuel-efficient modes of travel such as buses, car- and vanpools, and bicycles; and (2) attitudes toward plans for higher density and mixed-use developments around transit stations such as those proposed for the Honolulu rail transit project.

The policy recommendations also point to areas for further study, including obtaining a larger sample size over time to identify potential policies and their impact.

The Impact of High Gas Prices in 2008 on Travel Behavior

Findings

Retail prices for all grades and types of gasoline and diesel exceeded $4.00 per gallon for several months in mid-2008 throughout the State of Hawai‘i, before prices fell back to more customary levels later in the year. This spike in gasoline prices provided the SEET project with an opportunity to determine how motorists modified their travel behavior during that period.

The 2008 rise in gasoline prices had a notable effect on consumer behavior in Hawai‘i. Table 14 shows that nearly half (48.7%) of all respondents who had used one of their vehicles the previous week stated that they drove fewer miles, with the greatest reduction in Hawai‘i County (62.7%), followed by Kaua‘i (55.0%), and Maui (52.5%). Relatively fewer (44.6%) O‘ahu residents reduced their mileage.

Table 14: Respondents Who Reduced Number of Miles Driven When Gasoline Prices Went Above $4.00 per Gallon in 2008

	Total		Honolulu		Hawai‘i		Maui		Kaua‘i	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	584	48.7%	367	44.6%	111	62.7%	73	52.5%	33	55.0%
No	538	44.9%	404	49.1%	53	29.9%	58	41.7%	23	38.3%
Maybe or not sure	59	4.9%	40	4.9%	10	5.6%	6	4.3%	3	5.0%
Can't recall/Don't know/Refused	18	1.5%	12	1.5%	3	1.7%	2	1.4%	1	1.7%
Total	1,199	100.0%	823	100.0%	177	100.0%	139	100.0%	60	100.0%

Asked of those who used one of their vehicles for most of the trips they made last week.

[24] Data analyses and tables were prepared in November 2009 by Market Trends Pacific.

Over half (56.5%) undertook specific measures to cope with the higher prices (Table 15).

Table 15: Respondents Who Coped with High Gas Prices in 2008

	Number	%
Yes	677	56.5%
No	514	42.9%
Can't recall/Don't know/Refused	8	0.7%
Total	1,199	100.0%

Asked of those who made most of their trips last week in one vehicle.

Table 16 shows that the most widely used way to cope with higher gas prices in 2008 was combining errands in one trip (29.5%). It also lists the other used measures (not mutually exclusive), from driving less (18.0%), joining a carpool or vanpool (15.1%), consolidating trips (9.0%), and walking instead of driving (8.3%). These measures contribute toward fewer cars on the road, more efficient modes of transportation (i.e. carpooling), as well as other co-benefits such as improved health (i.e. more walking and biking).

Table 16: Measures to Cope with Higher Gas Prices in 2008

	Number	%
Combined errands	200	29.5%
Less driving	122	18.0%
Joined a carpool or vanpool	102	15.1%
Walked more often	56	8.3%
Consolidate trips	61	9.0%
Checked the tires for proper inflation	38	5.6%
Took the public bus, on your island, more often	39	5.8%
Reduced my average driving speed to increase fuel economy	45	6.6%
Save money	25	3.7%
Shopped at stores closer to home	26	3.8%
Spent less money on other goods and service	22	3.3%
Other means of travel	12	1.8%
Better planning of trips	6	0.9%
Used a bicycle more often	17	2.5%
Worked at home more often	4	0.6%
Purchased or used a more fuel-efficient vehicle	14	2.1%
Called for a ride	2	0.3%
Stayed at home	5	0.7%
Other	74	10.9%
Can't recall/Don't know/Refused	14	2.0%
Total Respondents	677	

Asked of those who did something to cope with higher gas prices in 2008. Numbers and percents add to more than the total due to multiple responses.

The adopted change in resident behavior as a result of high gasoline prices continued even after prices declined. Table 17 shows that an overwhelming majority (82.1%) of those who did one thing to cope with higher gas prices in 2008 reported that they were still doing that during the survey period in 2009. This speaks to the ability of people to change their transportation habits and patterns given substantially higher gas prices.

Table 17: Respondents Maintaining Coping Measures

	Number	%
Yes	449	82.1%
No	78	14.3%
Can't recall/Don't know/Refused	20	3.7%
Total	547	100.0%

Those who did one thing to cope with higher gas prices in 2008.

Policy Discussion and Recommendations

A number of cost-saving measures were adopted when gasoline prices rapidly rose in mid-2008. Motorists adjusted to the rising price of oil by combining trips, carpooling, and even changing their work schedule. In addition, even as gasoline prices declined, a number of these behaviors remained. It is widely documented that sudden changes in oil prices cause real economic impact – this means that the "adjustment period" can be economically deleterious.[25] Once people and businesses have adopted new behaviors, the price level ceases to be as consequential. As such, rising oil prices and, subsequently, gasoline prices at the pump, can greatly alter motorist behavior. While the sudden oil price increase in 2008 was likely a result of market forces, the survey results nonetheless demonstrate the effectiveness of market-based policy mechanisms in achieving a more energy-efficient transportation system.

There are a number of policy mechanisms that achieve increased gasoline prices. At the federal level, the proposed cap-and-trade policy within the American Clean Energy and Security Act 2009 (H.R. 2454) would have served this purpose. Although it was passed in the House, it made no further progress in the Senate. There remains substantial uncertainty within the proposed amendments and, in particular, there is currently greater emphasis on stationary greenhouse gas sources (as opposed to transportation). A carbon tax, at the federal or state level, could also achieve this goal. At the state level, a tax on oil imports by the barrel would serve as an "upstream" price mechanism; increasing the gasoline tax at the pump would be a "downstream" price mechanism.

The fuel tax (federal and state) serves as a disincentive to motorists. The current federal fuel tax rate is 18.4 cents per gallon for gasoline and 24.4 cents per gallon for diesel fuel.[26] State fuel taxes range from 7.5 cents per gallon in Georgia to 31 cents per gallon in Rhode Island. Honolulu's fuel tax is currently at 16.5 cents per gallon.[27] Act 73 (2010 Legislature) was passed on April 29, 2010, establishing an environmental response, energy, and food security tax of $1.05 per barrel, or 2.5 cents a gallon, of petroleum product except for aviation fuel.

It should be noted that the level of tax matters. To induce behavioral change, prices need to hit a certain threshold. Although $4.00 per gallon of gasoline was used as a baseline in this study due to recent events, further study would be needed to determine an optimal gasoline tax rate, taking into account both environmental outcomes and funding of public infrastructure. This study nonetheless provides insight into how "sensitive" residents are to changes in gasoline prices (i.e., serving as a baseline for projected consumer response).

Opposition to taxation of this sort often organizes on the grounds that it will disproportionately impact the poor.[28] Gasoline expenditures are typically a larger fraction of income for low-

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[25] Coffman, M. (2008). "Oil price shocks and Hawai'i's economy: An analysis of the oil-price macroeconomy relationship," *Annals of Regional Science*. DOI 10.1007/s00168-008-0271-6.
[26] http://www.cbo.gov/ftpdocs/51xx/doc5159/03-09-CAFEbrief.pdf
[27] http://www.starbulletin.com/editorials/20100512_County_fuel_tax_hike_would_hit_rural_O'ahu_hardest.html
[28] Sterner, Thomas. Fuel taxes: An important instrument for climate policy. Department of Economics, Goteborg University, Sweden. *Energy Policy* 35,3194–3202, 2007.

income than higher-income households.[29] Nonetheless, the fixed cost of owning a vehicle excludes the lowest income groups.[30] Policy aimed at changing behaviors regarding energy consumption (transportation or otherwise) through price incentives can be appropriately structured such that regressive impacts to real income are offset for the underprivileged. An example of such policy design is to use a portion of the tax revenue to adjust the income tax structure, further utilize mechanisms like the earned income tax credit, or return the revenue in the form of a lump-sum payment. On the other hand, studies have shown that opposition to pollution-based taxes is diminished if revenues are purposefully set aside for strategic environmental initiatives, rather than to the general fund.[31]

After seeing preliminary study results, several members of the Hawai‘i Energy Policy Forum Transportation Working Group suggested establishing a “price floor” on gasoline throughout the state, where gasoline prices and consumer behavior could drive optimal price setting.

Vehicle Use, Ownership & New Purchases

Findings

Survey participants were asked a series of questions regarding their driving status, access to vehicles, and vehicle ownership. Seven out of eight survey respondents (87.7%) had a driver's license (Table 18), and 94.7% had access to a motor vehicle in the household for their personal use (Table 19).

Table 18: Respondents with a License to Drive a Motor Vehicle

	Number	%
Yes	1,348	87.7%
No	188	12.3%
Total	1,536	100.0%

Table 19: Respondents Who Own, Lease or Have Access to at Least One Vehicle

	Number	%
Yes	1,277	94.7%
No	71	5.3%
Total	1,348	100.0%

Asked of those who have a license to drive a motor vehicle.

As shown in Table 19, most respondents with a driver’s license own, lease or have access to at least one motor vehicle in the household for personal use. In fact, they frequently have two or more vehicles at their disposal (63.5%), and more than one out of five (22.4%) has three or more vehicles as shown in Table 20.

[29] Poterba, M. James. Is the gasoline tax regressive? Published by: The University of Chicago. *Tax Policy and the Economy*,Vol.5. pp. 145-164, 1991.
[30] Lin, Cynthia C.Y. and Prince Lea. The optimal gas tax for California. Department of Agricultural and Resource Economics, University of California. *Energy Policy* 37,5173–5183, 2009.
[31] Hsu, Shing Ling, Joshua Walters and Anthony Purgas. Pollution tax heuristics: An empirical study of willingness to pay higher gasoline taxes. University of British Columbia Faculty of Law, Canada. *Energy Policy* 36, 3612–3619, 2008.

Table 20: Number of Respondents Who Owned, Leased or Had Access to Vehicles in the Household by Number of Vehicles

	Number	%
1 vehicle	459	35.9%
2 vehicles	525	41.1%
3 vehicles	206	16.1%
4 vehicles	54	4.2%
5 vehicles	15	1.2%
6 or more vehicles	12	0.9%
Don't know/Refused	6	0.5%
Total	1,277	100.0%

Asked of those with a driver's license and own, lease or have access to at least one motor vehicle in their household for personal use.

Vehicle Use

Table 21 shows that almost all respondents (94.3%) used one vehicle for the majority of trips the previous week.

Table 21: Was There One Vehicle Used for Most of the Trips Last Week?

	Number	%
Yes	1,199	94.3%
No	72	5.7%
Don't know/refused	1	0.1%
Total	1,272	100.0%

Asked of those who have access to one or more vehicles in the household.

Table 22 shows that about half of the respondents (50.1%) used a passenger car. Others used trucks (18.7%), sport utility vehicles (15.8%) or vans (13.0%).

Table 22: Type of Vehicle Used for Most of the Trips Made Last Week

	Number	%
Passenger car	601	50.1%
Van	156	13.0%
Sport utility vehicle	189	15.8%
Truck	224	18.7%
Motorcycle, motor scooter, moped, etc	7	0.6%
Another type of vehicle	17	1.4%
Don't know/Refused	5	0.4%
Total	1,199	100.0%

Asked of those who used one vehicle for most of the trips they made last week.

When asked about fuel efficiency of the vehicle they had driven the previous week, respondents estimated an average of 23 miles per gallon. Table 23 shows that fewer than half of these vehicles were five years old or less (40.9%), and nearly three-fourths (74.1%) were 10 years old or less.

Table 23: Age of Vehicle Used Last Week

	Number	%
0-5 years	490	40.9%
6-10 years	398	33.2%
11-15 years	175	14.6%
16+ years	82	6.8%
Don't know/Refused	54	4.5%
Total	1,199	100.0%

Asked of those who used one of their vehicles for most of the trips they made last week.

Slightly more than half of the respondents (52.6%) drove their vehicles 10,000 miles or less in 2008. The statewide and county distributions are provided in Table 24. Based on the survey data, the estimated vehicle miles traveled (VMT) per respondent in 2008 was 10,300 (statewide), 9,854 (City & County of Honolulu), 13,082 (Hawaii County), 10,043 (Maui County), and 9,820 (Kauai County).[32] [33] [34]

Table 24: Miles Driven in 2008

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
1 to 5,000 miles	260	24.0%	179	24.1%	34	21.1%	33	25.7%	15	27.0%
5,001 to 10,000 miles	309	28.6%	203	27.5%	45	28.0%	40	31.4%	21	38.0%
10,001 to 15,000 miles	171	15.8%	126	17.1%	22	13.9%	16	12.9%	6	10.8%
15,001 to 20,000 miles	62	5.7%	33	4.5%	19	11.7%	9	7.0%	1	1.9%
More than 20,000 miles	73	6.7%	47	6.4%	16	9.9%	7	5.3%	3	5.3%
Can't recall/Don't know/Refused	207	19.2%	151	20.3%	25	15.5%	23	17.8%	9	16.9%
Total	1,082	100.0%	740	100.0%	160	100.0%	127	100.0%	55	100.0%

Asked of those who drove this vehicle in 2008

Table 25 shows the percentage of respondents who drove a motor vehicle to various destinations the previous week. The statewide percentages were indicative of results for each county. At the state level, most people drove from home to work (63.9%), to a shopping center or mall (73.6%), or to other destinations (73.5%). Given that the survey was taken during the summer months of 2009, it is not surprising that far fewer had dropped off a child at school (17.5%) or had driven to school themselves (4.2%).

[32] The raw data suggests that average VMT per vehicle for the City & County of Honolulu is 10,814. Nonetheless, one observation was an "outlier" at 200,000 miles. While Market Trends Pacific Inc. confirmed that a respondent provided this large number; it was dropped for the purposes of analysis because of the seeming implausibility.

[33] The VMT estimate by county is based on the stated miles driven per vehicle in 2008 when possible. If respondents refused to state a mileage estimate, they were asked whether they drove within specified ranges (between 1 and 5,000 miles, 5,001 and 10,000 miles, 10,001 and 15,000 miles, 15,001 and 20,000 miles, and over 20,000 miles). The "midpoint" value was selected from each of these ranges to provide an estimate of that person's annual vehicle miles traveled. People above 20,000 miles, to err on the cautionary side, were assumed to drive exactly 20,000 miles. The majority of respondents stated their actual vehicle miles traveled (776 of 875 respondents, excluding those who "Can't recall/Don't know/Refused, or 88.7%).

[34] The statewide estimate is a weighted average of county estimates.

Table 25: Destinations Last Week

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Drove vehicle to work										
Yes	816	63.9%	563	63.5%	112	61.2%	100	69.0%	41	65.1%
No	460	36.0%	323	36.5%	71	38.8%	44	30.3%	22	34.9%
Don't Know/Refused	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	1,277	100.0%	886	100.0%	183	100.0%	145	100.0%	63	100.0%
Drove vehicle to a school, college or university to attend classes										
Yes	53	4.2%	26	2.9%	15	8.2%	10	6.9%	1	1.6%
No	1,224	95.8%	860	97.1%	167	91.3%	135	93.1%	61	96.8%
Total	1,277	100.0%	886	100.0%	183	100.0%	145	100.0%	63	100.0%
Drove vehicle to drop off a child at school										
Yes	224	17.5%	158	17.8%	36	19.7%	20	13.8%	10	15.9%
No	1,052	82.4%	728	82.2%	146	79.8%	125	86.2%	53	84.1%
Total	1,277	100.0%	886	100.0%	183	100.0%	145	100.0%	63	100.0%
Drove vehicle to a major shopping center or mall										
Yes	940	73.6%	634	71.6%	149	81.4%	107	73.8%	50	79.4%
No	336	26.3%	252	28.4%	34	18.6%	37	25.5%	13	20.6%
Don't Know/Refused	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	1,277	100.0%	886	100.0%	183	100.0%	145	100.0%	63	100.0%
Drove vehicle to any other destination on island										
Yes	938	73.5%	660	74.5%	133	72.7%	98	67.6%	47	74.6%
No	324	25.4%	212	23.9%	50	27.3%	47	32.4%	16	25.4%
Don't Know/Refused	14	1.1%	14	1.6%	0	0.0%	0	0.0%	0	0.0%
Total	1,277	100.0%	886	100.0%	183	100.0%	145	100.0%	63	100.0%

Asked of those who have a license to drive a motor vehicle or own, lease or have access to at least one motor vehicle in household for personal use

Table 26 shows that commute trips taken the previous week typically took 20 to 24 minutes (median response) to go to work; 25 to 29 minutes to attend a school, college or university; and 15 to 19 minutes to drop off a child at school or go to a shopping center or mall.

Table 26: Travel Time from Home to Destinations

	No.	%
Usual minutes to work		
Less than 5 minutes	30	3.7%
5 to 9 minutes	92	11.3%
10 to 14 minutes	81	9.9%
15 to 19 minutes	142	17.4%
20 to 24 minutes	138	16.9%
25 to 29 minutes	41	5.0%
30 to 34 minutes	119	14.6%
35 to 39 minutes	12	1.5%
40 to 44 minutes	43	5.3%
45 to 59 minutes	51	6.3%
60 to 89 minutes	46	5.6%

Table 26 Continued: Travel Time from Home to Destinations

	No.	%
90 or more minutes	18	2.2%
Destination of trip varied from day to day	1	0.1%
Can't Recall/Don't know/Refused	2	0.2%
Total	816	100.0%
Usual minutes to attend school, college or university		
5 to 9 minutes	5	9.4%
10 to 14 minutes	10	18.9%
15 to 19 minutes	3	5.7%
20 to 24 minutes	5	9.4%
25 to 29 minutes	14	26.4%
30 to 34 minutes	8	15.1%
40 to 44 minutes	2	3.8%
45 to 59 minutes	1	1.9%
60 to 89 minutes	1	1.9%
Destination of trip varied from day to day	0	0.0%
Can't Recall/Don't know/Refused	2	3.8%
Total	53	100.0%
Usual minutes to drop off a child at school		
Less than 5 minutes	19	8.5%
5 to 9 minutes	38	17.0%
10 to 14 minutes	51	22.8%
15 to 19 minutes	48	21.4%
20 to 24 minutes	19	8.5%
25 to 29 minutes	1	0.4%
30 to 34 minutes	24	10.7%
35 to 39 minutes	1	0.4%
40 to 44 minutes	2	0.9%
45 to 59 minutes	6	2.7%
90 or more minutes	15	6.7%
Total	224	100.0%
Usual minutes to shopping center or mall		
Less than 5 minutes	28	3.0%
5 to 9 minutes	133	14.1%
10 to 14 minutes	181	19.3%
15 to 19 minutes	192	20.4%
20 to 24 minutes	175	18.6%
25 to 29 minutes	59	6.3%
30 to 34 minutes	99	10.5%
35 to 39 minutes	4	0.4%
40 to 44 minutes	12	1.3%
45 to 59 minutes	26	2.8%
60 to 89 minutes	25	2.7%
90 or more minutes	4	0.4%
Can't Recall/Don't know/Refused	2	0.2%
Total	940	100.0%

Asked of those who drove a vehicle last week from home to the indicated locations

For respondents making such journeys, the previous week typically involved an average of 5.1 commute trips to work; 4.0 trips to drop off a child at school; 2.9 trips to a school, college or university to attend classes; and 2.0 trips to a major shopping center or mall.

Vehicle Ownership and Purchase

The survey revealed a high-level of interest in fuel-efficient vehicles, particularly hybrid gas-electric vehicles. Although surveyed during a period of economic recession in Hawai'i and the globe, Table 27 shows that nearly three out of every 10 respondents (29.2%) expect to acquire a vehicle within the next three years, with greater percentages in Maui (30.7%) and Honolulu (30.5%) than in Hawai'i (22.2%) and Kaua'i (25.8%).

Table 27: Respondents that Expect to Buy or Lease a New Vehicle in the Next Three Years

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	448	29.2%	332	30.5%	45	22.2%	52	30.7%	19	25.8%
No	909	59.2%	645	59.1%	123	60.8%	93	55.5%	47	63.4%
Maybe	152	9.9%	95	8.7%	29	14.4%	21	12.4%	7	9.7%
Can't recall/Don't know/Refused	27	1.7%	18	1.7%	5	2.6%	2	1.3%	1	1.1%
Total	1,536	100.0%	1,091	100.0%	203	100.0%	168	100.0%	74	100.0%

Table 28 shows that more than one-third (35.8%) said that the vehicle's fuel economy was the most important factor governing their choice of a new vehicle. Fuel economy was most important across all counties, while other factors varied across the counties.

Table 28: Most Important Factor in Choosing the Next Vehicle

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Dependability	86	14.3%	59	13.8%	10	14.1%	11	14.8%	6	22.2%
Fuel economy	215	35.8%	161	37.6%	22	30.2%	25	34.2%	7	27.9%
Ability to run on different kinds of fuel	11	1.8%	4	1.0%	3	3.9%	2	3.2%	1	5.4%
Low price	61	10.2%	42	9.7%	12	16.4%	5	6.7%	3	10.8%
Quality	80	13.2%	57	13.2%	10	12.9%	11	15.5%	2	8.2%
Safety	99	16.6%	75	17.4%	10	13.9%	12	16.3%	3	10.3%
None of these	33	5.4%	24	5.7%	2	2.2%	4	4.9%	3	12.2%
Don't know/refused	15	2.5%	7	1.5%	5	6.4%	3	4.4%	1	3.1%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%

Expect to or might buy or lease a motor vehicle in the next three years

Table 29 shows that almost two-thirds (65%) of those who would or might buy or lease a vehicle in the next three years are very likely or somewhat likely to buy a hybrid vehicle.

Table 29: Likelihood of Buying or Leasing a Hybrid Gas-Electric Vehicle

	Number	%
Very likely	184	30.6%
Somewhat likely	207	34.4%
Not likely at all	190	31.6%
Don't know/Refused	20	3.3%
Total	601	100.0%

Asked of those who expect to or might buy or lease a motor vehicle in the next Three years.

Those expecting to acquire a vehicle were asked what would persuade them to purchase a more fuel-efficient vehicle. The two most persuasive reasons statewide were higher gas prices (54.2%) and more cash for their trade-in vehicle (54.2%). The other reasons in descending order were: permission to use high-occupancy vehicle (HOV) lanes (42.9%); a tax credit for the purchase of a hybrid car (49.3%); and free or preferential parking at work (44.3%). There were differences by county, with Honolulu and Kaua‘i persuaded by gas prices (55.5% and 61.5%, respectively); Maui and Hawai‘i counties favored cash for trade-in (60.3% and 58.1%, respectively). There was more support on O‘ahu for free or preferential parking at work (48.9%) and permission to use high-occupancy vehicle or HOV lanes (49.6%), and more support on all three Neighbor Island counties for a tax credit to offset the higher initial cost of the vehicle (Table 30).

Table 30: Reasons to Purchase a More Fuel Efficient Vehicle

	Total		Honolulu		Hawai‘i		Maui		Kaua‘i	
	No.	%	No.	%	No.	%	No.	%	No.	%
A tax credit to offset the higher initial cost of the vehicle										
Yes	296	49.3%	200	46.8%	39	52.7%	43	58.9%	15	57.7%
No	107	17.8%	77	18.0%	13	17.6%	13	17.8%	4	15.4%
Maybe	194	32.3%	150	35.1%	20	27.0%	16	21.9%	8	30.8%
Don't know/Refused	3	0.5%	0	0.0%	2	2.7%	1	1.4%	0	0.0%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%
More cash for the vehicle you trade in										
Yes	326	54.2%	225	52.7%	43	58.1%	44	60.3%	14	53.8%
No	127	21.1%	90	21.1%	17	23.0%	14	19.2%	6	23.1%
Maybe	137	22.8%	106	24.8%	13	17.6%	11	15.1%	6	23.1%
Don't know/Refused	11	1.8%	7	1.6%	1	1.4%	3	4.1%	0	0.0%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%
Free or preferential parking at work										
Yes	266	44.3%	209	48.9%	26	35.1%	24	32.9%	8	30.8%
No	270	44.9%	178	41.7%	35	47.3%	41	56.2%	16	61.5%
Maybe	51	8.5%	33	7.7%	11	14.9%	6	8.2%	2	7.7%
Don't know/Refused	13	2.2%	8	1.9%	3	4.1%	2	2.7%	1	3.8%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%
Permission to use high-occupancy vehicle or HOV lanes										
Yes	258	42.9%	212	49.6%	23	31.1%	16	21.9%	6	23.1%
No	253	42.1%	168	39.3%	29	39.2%	41	56.2%	15	57.7%
Maybe	57	9.5%	33	7.7%	12	16.2%	8	11.0%	3	11.5%
Don't know/Refused	33	5.5%	14	3.3%	10	13.5%	7	9.6%	2	7.7%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%
Higher gas prices than currently exist										
Yes	326	54.2%	237	55.5%	41	55.4%	32	43.8%	16	61.5%
No	162	27.0%	105	24.6%	21	28.4%	30	41.1%	7	26.9%
Maybe	107	17.8%	86	20.1%	10	13.5%	9	12.3%	3	11.5%
Don't know/Refused	5	0.8%	0	0.0%	2	2.7%	2	2.7%	1	3.8%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%

Asked of those who expect to or might buy or lease a motor vehicle in the next three years

Table 31 reports other reasons given by respondents for purchasing a more fuel-efficient vehicle.

Table 31: Other Reasons to Purchase a More Fuel-Efficient Vehicle

	Number	%
Nothing else	194	63.8%
Protect the environment	33	10.9%
Environmentally sound vehicles	29	9.5%
Reasonable prices	16	5.3%
Improving technology	11	3.6%
More availability	9	3.0%
Other	13	4.3%
Total	304	100.0%

Asked of those who expect to or might buy or lease a motor vehicle in the next three years.

Table 32 shows that of those respondents who expect to buy or lease a motor vehicle in the next three years, about 17.1% would be motivated to purchase a more fuel-efficient vehicle if gas prices rose to $4.00 per gallon, 16.3% said $5.00 per gallon, and 11.7% said $6.00 per gallon. However, over one fourth (27.5%) of the respondents indicated that higher gas prices would not motivate them to purchase a more fuel-efficient car. Table 32 also shows differences in these results by county.

Table 32: Price of Gasoline as Motivation for Purchase of a Fuel-Efficient Vehicle

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
$3.00 per gallon	79	13.2%	63	14.8%	6	8.6%	6	8.6%	3	11.9%
$3.50 per gallon	25	4.2%	13	2.9%	5	6.3%	6	8.4%	2	7.0%
$4.00 per gallon	103	17.1%	83	19.3%	9	12.3%	9	12.3%	2	7.8%
$4.50 per gallon	26	4.3%	20	4.6%	1	1.2%	3	4.6%	2	6.0%
$5.00 per gallon	98	16.3%	66	15.5%	12	16.1%	15	21.3%	4	16.3%
$6.00 or more per gallon	70	11.7%	40	9.4%	11	14.5%	14	19.3%	5	18.6%
None of the above	165	27.5%	120	28.2%	24	32.1%	13	18.0%	8	30.9%
Don't know	35	5.8%	22	5.2%	7	8.8%	5	7.4%	0	1.6%
Total	601	100.0%	427	100.0%	74	100.0%	73	100.0%	26	100.0%

Asked of those who expect to or might buy or lease a motor vehicle in the next three years.

Clean Fuels

Most respondents were familiar with biodiesel and ethanol fuel options. Table 33 shows that 59.8% of respondents are "very" or "somewhat familiar" with biodiesel and ethanol fuel.

Table 33: Familiarity with Biodiesel and Ethanol Fuels for Vehicles

	Number	%
Very	403	26.3%
Somewhat	515	33.5%
Not familiar	601	39.1%
Don't know/Refused	17	1.1%
Total	1,536	100.0%

Of those who are familiar with these fuels, Table 34 shows that 47.6% would consider buying or leasing a vehicle that is able to run mainly on biodiesel or ethanol.

Table 34: Respondents Who Would Consider Buying or Leasing a Biodiesel or Ethanol Vehicle

	Number	%
Yes	437	47.6%
No	278	30.3%
Maybe	185	20.2%
Don't know/Refused	18	2.0%
Total	918	100.0%

Asked of those who are very familiar or somewhat familiar with biodiesel and ethanol fuels.

Among those who would or might consider buying or leasing an alternative fuel vehicle, most had no preference (48.1%). Nearly a third, 33.1%, would choose biodiesel while 13.8% would prefer ethanol E85 (85% of the fuel is ethanol), as shown in Table 35.

Table 35: Alternative Fuel Preference

	Number	%
Ethanol E85, 85% of the fuel is ethanol	86	13.8%
Biodiesel	206	33.1%
No preference	299	48.1%
Don't know/Refused	31	5.0%
Total	622	100.0%

Asked of those who would or might consider buying or leasing a vehicle able to run primarily on biodiesel or ethanol fuels. Numbers within the table are larger than the total number of respondents due to multiple responses.

Policy Discussion & Recommendations

Extrapolating from the three-year time horizon given to survey respondents regarding new car purchases, roughly one in ten "motorized" residents in Hawai'i purchase a new vehicle every year – and this finding is likely higher in better economic times. Fuel efficiency was the number one priority among respondents for new vehicle purchases ("safety" being the second overall, though this varied by county). As such, respondents were quite open to fuel efficient technologies such as hybrid gas-electric vehicles as well as fuel switching, particularly to biodiesel.

While the price of gasoline remains the primary motivator in purchasing a more fuel-efficient vehicle, various incentives also appeal to consumers. They include reducing the upfront cost of the new vehicle (through higher trade-in values and tax credits), as well as reducing "daily costs" through mechanisms like preferential parking and access to relatively less congested HOV lanes. It should be noted that these policy mechanisms are substantively different in terms of their effect on consumers. "Daily cost" reduction mechanisms may support the purchase of a more fuel-efficient vehicle, but will not support mode shifts to public transportation. In general, such policies (without larger price signals) may support fuel-efficiency in transportation, but may not support an overall reduction in fossil fuel consumption (i.e. has little impact on reducing vehicle miles traveled).

"Upfront cost" reductions such as subsidy mechanisms at the state level will support purchase of fuel-efficient vehicles and/or biofuels; but will also require government funding. As such, and due to the fact that there should be an overall price signal to lead to a reduction in fossil fuel

consumption, subsidies for fuel efficiency in transportation should be coupled with taxation (i.e., both a behavior-changing mechanism, tax or subsidy, and a dedicated funding source).

The estimated vehicle miles traveled (VMT) per vehicle (statewide) as reported by respondents is 10,300 for 2008. This is in contrast to the per-vehicle VMT estimate of 9,059 as reported in the State of Hawai'i Data Book. The difference between the estimates, at 13.6%, is quite substantial. It was determined statistically that the figures are meaningfully distinct at the 99% confidence level.[35] The difference in estimates suggests a need to collect *actual* data on vehicle miles traveled within the state. These data are collected by the Department of Motor Vehicles of the City and County of Honolulu. An effort should be made to explore the possibility of obtaining these data to test against the estimates. Actual data, if collected and available for ongoing analyses, would be invaluable in testing the impacts of various energy-efficiency policies on ground transportation.

While most respondents were familiar with biofuels, biodiesel and ethanol, many were not. Among those who were familiar, biodiesel was more often preferred to ethanol (E85). This suggests that biodiesel will likely be adopted by consumers more readily than ethanol, as well as diesel vehicles in comparison to flex-fuel vehicles. Guidance from the Working Group suggested that there are currently too many uncertainties to pursue state policies on biofuels for ground transportation (as policies are currently being considered under the auspices of the state's "Bioenergy Master Plan" and other state-funded bioenergy studies). Nonetheless, this preference should be kept in mind within any state strategy to adopt biomass-based fuel sources.

Instead, the Working Group suggested that the state policy focus should be on fuel-switching in favor of electric vehicles. In addition, the Working Group members were struck by the high number of vehicles owned per person/household, and discussed the need to introduce car-sharing as a way to decrease overall car dependency while maintaining mobility. Other measures discussed by the Working Group include increasing vehicle registration fees as the number of vehicles owned per household increases beyond two or three vehicles per household.

Public Transit: Bus Transit

Findings

Survey participants were asked a series of questions about their use and preferences regarding use of the bus on their island. Table 36 shows that 18.2% statewide rode the bus the previous week, with bus ridership highest in Honolulu (22.7%), followed by Kaua'i (11.0%), Maui (8.1%) and lowest in Hawai'i County (4.7%).

[35] A two-sided hypothesis test was used to determine whether the two reported values of per vehicle VMT, that were collected within this study and the number reported in the Data Book, are meaningfully different. The test gives a t-statistic of 3.8 (with degrees of freedom 874), which implies that the numbers are statistically different from one another.

Table 36: Respondents that Rode TheBus/The Kauai Bus/The Maui Bus/Hele On for Any Trip Last Week

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	279	18.2%	247	22.7%	10	4.7%	14	8.1%	8	11.0%
No	1,257	81.8%	843	77.3%	193	95.3%	155	91.9%	66	89.0%
Total	1,536	100.0%	1,091	100.0%	203	100.0%	168	100.0%	74	100.0%

Respondents were also asked: "What would it take for you to ride the bus more often?" Multiple answers were allowed. Table 37 lists the most frequently selected incentives to take the bus more often. On a statewide basis, 51.4% of respondents said that "nothing would motivate me to take the bus more often." The results by county showed higher percentages for both Hawai'i County (53,7%) and Honolulu (52.2%) than for Kaua'i (47.3%) and Maui (44.6%). Many offered suggestions to increase bus ridership, as provided in Table 37. The most popular answers across the state were "more convenient bus stops" (14.1%) and "more frequent service" (13.6%). O'ahu and Neighbor Island respondents generally agreed; however, more people on O'ahu favored more frequent service (12.0%) while Neighbor Island respondents as a whole preferred more convenient bus stops (24.0%).

Table 37: Incentives to Ride TheBus/The Kauai Bus/The Maui Bus/Hele On More Often
(Note: More than one response was allowed.)

	Total		Honolulu		Hawai'i		Maui		Kaua'i		Neighbor Island Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
More convenient bus stops	217	14.1%	110	10.1%	43	21.2%	47	28.0%	17	23.0%	107	24.0%
More frequent service	209	13.6%	131	12.0%	37	18.2%	27	16.1%	14	18.9%	78	17.5%
I do/will use the bus	95	6.2%	85	7.8%	5	2.5%	3	1.8%	2	2.7%	10	2.2%
A lower or free fare	73	4.8%	56	5.1%	6	3.0%	8	4.8%	3	4.1%	17	3.8%
More reliable service	47	3.1%	29	2.7%	3	1.5%	9	5.4%	6	8.1%	18	4.0%
I won't ride because it is inconvenient (timing, routes, difficult)	35	2.3%	27	2.5%	4	2.0%	3	1.8%	1	1.4%	8	1.8%
A faster ride	34	2.2%	22	2.0%	3	1.5%	6	3.6%	3	4.1%	12	2.7%
Less crowded buses	32	2.1%	29	2.7%	1	0.5%	1	0.6%	1	1.4%	3	0.7%
Ride to go to certain places (destination is far, special events,)	27	1.8%	18	1.6%	3	1.5%	5	3.0%	1	1.4%	9	2.0%
Bus schedule issues	18	1.2%	11	1.0%	3	1.5%	3	1.8%	1	1.4%	7	1.6%
My car is not available (breakdown, no license)	14	0.9%	10	0.9%	3	1.5%	0	0.0%	1	1.4%	4	0.9%
I won't/can't use the bus	13	0.8%	2	0.2%	5	2.5%	5	3.0%	1	1.4%	11	2.5%
More comfortable seats	8	0.5%	5	0.5%	1	0.5%	1	0.6%	1	1.4%	3	0.7%
Walk/other means of travel	5	0.3%	3	0.3%	1	0.5%	1	0.6%	0	0.0%	2	0.4%
If gas price increases	4	0.3%	3	0.3%	1	0.5%	0	0.0%	0	0.0%	1	0.2%
Nothing would motivate me to take a bus	789	51.4%	570	52.2%	109	53.7%	75	44.6%	35	47.3%	219	47.3%
Other	21	1.4%	17	1.6%	1	0.5%	2	1.2%	1	1.4%	4	49.2%
Don't know/Refused	85	5.5%	69	6.3%	6	3.0%	7	4.2%	3	4.1%	16	3.6%
Total	1,536		1,091		203		168		74		445	

Numbers and percents add to more than totals due to multiple mentions

Table 38 indicates that most people (63.4%) said that there is a bus stop within a 10-minute walk of their residence; however, there were differences by county, with 75% on O'ahu, 44.3% on

Kaua‘i, 43.5% on Maui, and 24.0% on Hawai‘i County having a bus stop within 10 minutes of their home.

Table 38: Time (Distance) to Walk from Home to the Nearest Bus Stop in Neighborhood

	Total		Honolulu		Hawai‘i		Maui		Kaua‘i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 5 minutes	599	39.0%	534	49.0%	18	9.1%	33	19.8%	13	17.0%
About 5 to 10 minutes	374	24.4%	284	26.0%	30	14.9%	40	23.7%	20	27.3%
More than 10 minutes	468	30.5%	251	23.0%	115	56.6%	69	40.7%	34	45.6%
Not sure	81	5.3%	16	1.4%	38	18.9%	20	11.6%	7	9.9%
Refused	15	0.9%	6	0.6%	1	0.5%	7	4.1%	0	0.1%
Total	1,536	100.0%	1,091	100.0%	203	100.0%	168	100.0%	74	100.0%

The provision of parking may have an important impact on the use of public transit to go to work or attend school. To test this proposition, respondents were asked whether doubling the cost of parking would motivate them to use the bus instead of their personal vehicle. Table 39 shows the impact of higher parking prices, with 29.4% of respondents saying “maybe” they would use the bus if the price of parking doubled and 23.0% saying “yes” they would use the bus.

Table 39: Respondents that Would Use a Bus Instead of Personal Vehicle if Parking Cost Doubled

	Number	%
Yes	29	23.0%
No	60	47.6%
Maybe	37	29.4%
Don't know/Refused	1	0.8%
Total	126	100.0%

Asked of those who have to pay for parking where work or attend school

However, it should be noted that most of the respondents (84.4%) did not pay for parking at work or school as shown in Table 40. Only 15.3% of commuters statewide pay for parking at work or school, with the proportion higher on O‘ahu (19.6%) than on the Neighbor Islands (5.8%). This does not mean parking is “free,” however, as it may be paid by the employer.

Table 40: Respondents that Pay for Parking at Work or School

	Total		Honolulu		Hawai‘i		Maui		Kaua‘i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	126	15.3%	111	19.6%	11	9.6%	3	3.0%	1	2.4%
No	695	84.3%	453	79.9%	104	90.4%	98	97.0%	40	97.6%
Don't know/Refused	2	0.2%	2	0.4%	0	0.0%	0	0.0%	0	0.0%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%

Asked of those who commuted from home to work or school last week using a motor vehicle

Policy Discussion and Recommendations

Bus transit is an important mode of transportation for the state and could be enhanced, generally, by making service more convenient (more bus stops) and accessible (more frequent stops). However, there seems to be little incentive to take the bus for work or school commutes as parking cost apparently is not a problem for most respondents. While nearly 20% of commuters

would more likely take the bus if the cost of parking doubled, the majority of the population seems unwilling to take public transit in its present form.

Given the above, more in-depth analysis of the data would be helpful in determining factors that could improve bus ridership. Such a study was completed using the O‘ahu data and applying a linear econometric model to assess the attributes of bus service that may lead to increased ridership among those who have a choice in transportation (i.e. they also have access to a vehicle). The study serves as an example of the types of analyses that can be completed with the panel-type survey data collected.[36] See Appendix 6 for a copy of the study report.

Public Transit: Planned O‘ahu Rail System

Findings

The proposed rail transit system (connecting East Kapolei on the Ewa Plain to Ala Moana Shopping Center in Honolulu) provides another public transit mode. To assess the interest in and impact of the transit system affecting O‘ahu residents, the weighted sample for the City and County of Honolulu was used in the following section. Table 41 shows that approximately one in four O‘ahu respondents (26.4%) believed that their community or residential area would be served by the planned rail system.

Table 41: Respondents Who Expect that the Rail Transit System Will Provide Service to Their Community

	Number	%
Yes	288	26.4%
No	622	57.0%
Not sure	163	14.9%
Don't know/Refused	18	1.6%
Total	1,091	100.0%

Asked of those who live on the Island of Oahu, using the weighted sample size of 1,091

Assuming that the gas price rose and stayed above $4.00 per gallon, two-thirds of residents in likely rail transit service areas (66.2%) said they would use the rail system (Table 42).

Table 42: Respondents that Would Use the Rail System if Gasoline Prices Were Above $4.00 per Gallon

	Number	%
Yes	298	66.2%
No	64	14.2%
Maybe	88	19.6%
Total	450	100.0%

Asked of those Oahu residents who said that the planned rail transit system will or might provide service to their community

As shown in Table 43, almost half (49.4%) of all O‘ahu respondents stated that living in a neighborhood within walking distance of a rail transit stop appealed to them.

[36] The study was conduced by Gabrielle Sham, a Master’s candidate in the Department of Urban and Regional Planning, University of Hawai‘i at Mānoa based on weighted sample of O‘ahu residents.

Table 43: Use of the Rail Transit System if Resident Lived in a Neighborhood within Walking Distance of a Transit Stop

	Number	%
Yes	539	49.4%
No	371	34.0%
Maybe	143	13.1%
Don't know/Refused	38	3.5%
Total	1,091	100.0%

Policy Discussion & Recommendations

The preferences of consumers regarding the use of public transportation are critical in planning for the state and counties. While respondents did not in general embrace riding the bus, under various circumstances, e.g. higher gas prices or parking fees (if one pays for them), did have some impact. A follow-up study with a larger sample size, particularly for the Neighbor Island counties, would enable more in-depth assessment of the preferred incentives for using public transit. This assessment should consider these incentives in conjunction with the adoption of disincentives on the use of personal motor vehicles such as higher parking fees and gas prices.

Lifestyle Adjustments If Gas Prices Rise Again

Findings

Lifestyle adjustments may be necessary for people who commute to work or school, if the price of gasoline rose quickly and stayed high indefinitely. The survey asked respondents to consider several adjustments: switching to a four-day work-week, working from home more often, riding the bus or other public transportation more often, and even relocating one's work place or residence.

Table 44 shows adjustments that people would or might make if the price of gas rose and stayed above $4.00 per gallon. Respondents were allowed multiple answers. At the statewide level, the most popular action was to switch to a four-day workweek, if possible, which appealed to 57.4% of all commuters. This action was followed in descending order of popularity by three others: (1) work from home more often using a computer to communicate (35.9%); (2) use the bus or other public transportation (33.4%); and (3) look for a comparable job or school that would require a shorter commute or less driving (30.0%). The least popular action was to look for a place to live closer to work or school (14.0%). Almost half of the commuters (44.2%) said that they would or might "do nothing, just pay higher prices." The preferences were remarkably similar among all counties as provided in Table 44.

Table 44: If Gas Prices Went Above $4.00 per Gallon Again, Which Coping Measures Would Respondents Choose?

	Total		Honolulu		Hawai'i		Maui		Kaua'i	
	No.	%	No.	%	No.	%	No.	%	No.	%
Look for a place to live closer to work or school										
Yes	115	14.0%	75	13.2%	25	21.7%	10	9.9%	5	12.2%
No	641	77.8%	446	78.7%	76	66.1%	86	85.1%	33	80.5%
Maybe	59	7.2%	39	6.9%	12	10.4%	5	5.0%	3	7.3%
Don't know/Refused	9	1.1%	7	1.2%	2	1.7%	0	0.0%	0	0.0%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%
Work from home more often using a computer to communicate										
Yes	296	35.9%	189	33.3%	50	43.5%	42	41.6%	15	36.6%
No	442	53.6%	313	55.2%	54	47.0%	52	51.5%	23	56.1%
Maybe	74	9.0%	55	9.7%	10	8.7%	7	6.9%	2	4.9%
Don't know/Refused	12	1.5%	10	1.8%	1	0.9%	0	0.0%	1	2.4%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%
Switch to a four-day work week if possible										
Yes	473	57.4%	323	57.0%	73	63.5%	55	54.5%	22	53.7%
No	295	35.8%	203	35.8%	36	31.3%	41	40.6%	15	36.6%
Maybe	44	5.3%	31	5.5%	6	5.2%	4	4.0%	3	7.3%
Don't know/Refused	12	1.5%	10	1.8%	0	0.0%	1	1.0%	1	2.4%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%
Look for a comparable job or school that would require a shorter commute or less driving										
Yes	247	30.0%	170	30.0%	36	31.3%	31	30.7%	10	24.4%
No	501	60.8%	343	60.5%	68	59.1%	63	62.4%	27	65.9%
Maybe	60	7.3%	43	7.6%	9	7.8%	5	5.0%	3	7.3%
Don't know/Refused	16	1.9%	11	1.9%	2	1.7%	2	2.0%	1	2.4%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%
Use the bus or other public transportation										
Yes	275	33.4%	174	30.7%	48	41.7%	40	39.6%	13	31.7%
No	388	47.1%	270	47.6%	50	43.5%	47	46.5%	21	51.2%
Maybe	156	18.9%	121	21.3%	16	13.9%	13	12.9%	6	14.6%
Don't know/Refused	5	0.6%	2	0.4%	1	0.9%	1	1.0%	1	2.4%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%
Do nothing, just pay higher gas prices										
Yes	364	44.2%	261	46.0%	41	35.7%	47	46.5%	15	36.6%
No	328	39.8%	223	39.3%	51	44.3%	37	36.6%	17	41.5%
Maybe	86	10.4%	51	9.0%	15	13.0%	13	12.9%	7	17.1%
Don't know/Refused	46	5.6%	32	5.6%	8	7.0%	4	4.0%	2	4.9%
Total	824	100.0%	567	100.0%	115	100.0%	101	100.0%	41	100.0%

Asked of those who commuted from home to work or school last week using a motor vehicle

As shown in Table 44, over one-fifth (21.1%) of commuters statewide said that they would or might look for a place to live closer to work or school. They were then asked a series of hypothetical questions related to features of transit-oriented development or TOD, which is a component of the "smart growth" principle of city planning. Besides higher than average densities, a TOD typically will have a mixture of land uses (residential, office and retail), a

defined center, and buildings whose design and orientation facilitate transit use, along with bicycle and pedestrian activity. To avoid potential bias, the interviewer never mentioned the phrases "transit-oriented development" or "smart growth."

Table 45 presents preferences for eight TOD features for O'ahu and the Neighbor Islands. Although the Neighbor Island sample size is small it points to differences that should be further researched. For example, while the most attractive feature for residents statewide (60.3%) and for O'ahu (66.1%) was to live in a location within walking distance of food, drug and other retail stores, a majority of Neighbor Island residents preferred three other features: a common area for children to play (69.5%), has less space to park your vehicle but you could walk or use your bicycle more often (66.1%), and close to a bus stop (64.4%). The least desirable features at the state level were living in quarters with less space than one's present home (23.0%), followed by living in a building with professional offices and small retail stores (35.1%).

Table 45: Respondents that Would be Willing to Live in a New Place with a Shorter Commute that also Includes the Following Features

	Total		Honolulu		Hawai'i		Maui		Kaua'i		Neighbor Islands Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Has less space than your present home												
Yes	40	23.0%	11	9.6%	23	63.9%	5	33.3%	1	12.5%	29	49.2%
No	85	48.9%	69	60.0%	6	16.7%	7	46.7%	3	37.5%	16	27.1%
Maybe	34	19.5%	21	18.3%	7	19.4%	3	20.0%	3	37.5%	13	22.0%
Don't know/Refused	15	8.6%	14	12.2%	0	0.0%	0	0.0%	1	12.5%	1	1.7%
Total	174	100.0%	115	100.0%	36	100.0%	15	100.0%	8	100.0%	59	100.0%
Has a common area for children to play												
Yes	69	39.7%	28	24.3%	29	80.6%	9	60.0%	3	37.5%	41	69.5%
No	72	41.4%	59	51.3%	6	16.7%	4	26.7%	3	37.5%	13	22.0%
Maybe	27	15.5%	23	20.0%	1	2.8%	2	13.3%	1	12.5%	4	6.8%
Don't know/Refused	6	3.4%	5	4.3%	0	0.0%	0	0.0%	1	12.5%	1	1.7%
Total	174	100.0%	115	100.0%	36	100.0%	15	100.0%	8	100.0%	59	100.0%
Is located in a more densely populated area												
Yes	63	36.2%	34	29.6%	20	55.6%	6	40.0%	3	37.5%	29	49.2%
No	85	48.9%	63	54.8%	11	30.6%	8	53.3%	3	37.5%	22	37.3%
Maybe	25	14.4%	18	15.7%	5	13.9%	1	6.7%	1	12.5%	7	11.9%
Don't know/Refused	1	0.6%	0	0.0%	0	0.0%	0	0.0%	1	12.5%	1	1.7%
Total	174	100.0%	115	100.0%	36	100.0%	15	100.0%	8	100.0%	8	100.0%
Is located in a condominium within walking distance of food, drug and other retail stores.												
Yes	105	60.3%	76	66.1%	20	55.6%	6	40.0%	3	37.5%	29	49.2%
No	57	32.8%	32	27.8%	15	41.7%	8	53.3%	2	25.0%	25	42.4%
Maybe	11	6.3%	7	6.1%	1	2.8%	1	6.7%	2	25.0%	4	6.8%
Don't know/Refused	1	0.6%	0	0.0%	0	0.0%	0	0.0%	1	12.5%	1	1.7%
Total	174	100.0%	115	100.0%	36	100.0%	15	100.0%	8	100.0%	59	100.0%

Table 45 Continued: Respondents that Would be Willing to Live in a New Place with a Shorter Commute that also Includes the Following Features

	Total		Honolulu		Hawai'i		Maui		Kaua'i		Neighbor Islands Total	
Is located in a building that has professional offices or small retail stores												
Yes	61	35.1%	40	34.8%	16	44.4%	3	20.0%	2	25.0%	21	35.6%
No	95	54.6%	63	54.8%	19	52.8%	9	60.0%	4	50.0%	32	54.2%
Maybe	17	9.8%	12	10.4%	1	2.8%	3	20.0%	1	12.5%	5	8.5%
Don't know/Refused	1	0.6%	0	0.0%	0	0.0%	0	0.0%	1	12.5%	1	1.7%
Total	174	100.0%	115	100.0%	36	100.0%	15	100.0%	8	100.0%	59	100.0%
Is close to a bus stop (Neighbor Islands)												
Yes	38	64.4%	0	0.0%	24	66.7%	9	60.0%	5	62.5%	38	64.4%
No	13	22.0%	0	0.0%	9	25.0%	2	13.3%	2	25.0%	13	22.0%
Maybe	6	10.2%	0	0.0%	3	8.3%	2	13.3%	1	12.5%	6	10.2%
Don't know/Refused	2	3.4%	0	0.0%	0	0.0%	2	13.3%	0	0.0%	2	3.4%
Total	59	100.0%	0	0.0%	36	100.0%	15	100.0%	8	100.0%	59	100.0%
Is close to a bus or a potential rail transit stop (O'ahu)												
Yes	30	26.1%	30	26.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	48	41.7%	48	41.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Maybe	23	20.0%	23	20.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Don't know/Refused	14	12.2%	14	12.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	115	100.0%	115	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Has less space to park your vehicle, but you could walk or ride your bicycle more often												
Yes	83	47.7%	44	38.3%	23	63.9%	11	73.3%	5	62.5%	39	66.1%
No	74	42.5%	58	50.4%	11	30.6%	3	20.0%	2	25.0%	16	27.1%
Maybe	17	9.8%	13	11.3%	2	5.6%	1	6.7%	1	12.5%	4	6.8%
Total	174	100.0%	115	100.0%	36	100.0%	15	100.0%	8	100.0%	8	100.0%

Asked of commuters who would or might look for a place to live closer to work or school if the price of gas rose and stayed above $4 per gallon.

People who live in cramped quarters may be reluctant to move to even smaller homes to reduce commuting distance. Table 46 shows that a much higher percentage of O'ahu's commuters (38.7%), compared to those on Neighbor Islands (20.9%), live in relatively small homes (i.e., homes with less than 1,000 square feet of interior space). This may explain why O'ahu's commuters (9.6%) were less willing than those on Neighbor Islands (49.1%) to move to homes with less space in exchange for shorter commutes to work or school if gas prices rose and stayed above $4.00 per gallon, as shown in Table 45.

Table 46: Interior Space in Present Home of Respondents

	Total		Honolulu		Hawai'i		Maui		Kaua'i		Neighbor Islands Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 1,000 square feet	21	28.4%	12	38.7%	5	16.1%	2	25.0%	2	50.0%	9	20.9%
1,000 to 1,500 square feet	25	33.8%	15	48.4%	8	25.8%	2	25.0%	0	0.0%	10	23.3%
Over 1,500 square feet	13	17.6%	1	3.2%	9	29.0%	1	12.5%	2	50.0%	12	27.9%
Don't know/Refused	15	20.3%	3	9.7%	9	29.0%	3	37.5%	0	0.0%	12	27.9%
Total	74	100.0%	31	100.0%	31	100.0%	8	100.0%	4	100.0%	43	100.0%

Asked of those who would or might be willing to move, even if the new place had less space than their present home.

Table 47 shows that a small proportion of commuters statewide (13.4%) would look for a nicer place to live farther away from work or school, if their employer or school allowed them to work or take classes at home using their computer at least two days per week.

Table 47: Respondents that Would Look for a Residence Farther from Work or School if They Could Telecommute

	Number	%
Yes	110	13.4%
No	604	73.2%
Not sure	99	12.0%
Don't know/Refused	11	1.4%
Total	824	100.0%

Asked of those who commuted from home to work or school last week using a motor vehicle.

Policy Discussion & Recommendations

The survey results point to the willingness of some residents to make adjustments in their lifestyle to achieve a shorter commute time. These residents expressed a desire for easy access to services, multiple modes of mobility, and family-friendly spaces. About 23% of residents statewide would be willing to move to a smaller home with a shorter commute. It appears that the reluctance of others is based on the current size of their home (less than 1,000 square feet); they are not willing to sacrifice the living space they presently have for shorter commutes. Nevertheless, the study points to the fact that some residents are "warming up" to concepts of mixed-use, non-motorized and public modes of travel, and increased density. Land-use planning and zoning laws should thus be revisited and amended accordingly to encourage and foster more efficient "smart growth" development, focusing on in-fill development within urban areas, which would contribute toward achieving energy efficiency in transportation.

For a more detailed discussion of survey results on this topic for residents of O'ahu, see Appendix 5.

Exemplary Policies at the State and Federal Level

The SEET project team researched policies and programs in other jurisdictions to provide ideas and potential proposals that might be applied at the state and county level. This section provides further discussion and exploration of policies that may encourage greater energy-efficient transportation for the State of Hawai‘i and its four counties.

Many states have policies to promote energy efficiency in ground transportation. In 2002, California led the way by passing the nation's first law to require that all new cars, pickup trucks, sport utility vehicles, and minivans sold in the state meet global warming pollution limits, starting with the 2009 model year. Under the Clean Air Act Amendments of 1990, states have the option of adopting California's pollution standards, if the U.S. Environmental Protection Agency (EPA) grants a waiver. The EPA under President George W. Bush had denied California's waiver request at the end of 2007, but President Obama's EPA recently granted it. Arizona, Connecticut, Florida, Maine, Maryland, Massachusetts, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington adopted similar legislation, and other states are considering it. All together, these states represent well more than one-third of the U.S. car market. Motor vehicles that meet these "clean car" standards have the added benefit of using less gasoline or running on non-petroleum fuels.

In May 2009, the Obama administration set national standards to accelerate improvements in vehicle fuel economy. The standards set a vehicle fleet average of 35.5 miles per gallon by 2016, nearly 10 mpg higher than the current average established by the 1975 Corporate Average Fuel Economy standards. In addition, the Obama administration set a national greenhouse gas emission standard for cars and trucks of 250 grams per mile per vehicle for the 2016 model year. In May 2010, the Obama administration announced that it would issue new vehicle fuel economy standards in July 2011. The new standards will apply to big trucks and buses for the 2014-2018 model years. Nationwide, large trucks represent only 4% of the vehicle fleet, but they consume 20% of the fuel.[37] In contrast, the 2008 State of Hawai‘i Data Book indicates that large trucks represent 2.85% of all registered motor vehicles statewide but does not provide the breakdown by county. Table 17.16 in the 2008 State Data Book indicates that diesel fuel represented 10.15% of the fuel used for ground transportation in 2008. If large trucks and buses consumed most of the diesel fuel, then the nationwide figure on fuel consumption is twice that of Hawai‘i. As an island state without intercity traffic, Hawai‘i consumes less diesel fuel than trucks and buses on the mainland.

The President recently announced that the U.S. Environmental Protection Agency and the National Highway Traffic Safety Administration would set stricter fuel-economy standards for cars, light trucks, and SUVs. The new standards will take effect with the 2017 model year and continue through 2025. The goal of these standards will be to cut vehicle fuel consumption and exhaust emissions in half relative to current levels. Automakers prefer national fuel-efficiency standards for motor vehicles to a state-by-state approach to standard setting. In addition, a uniform set of national standards enables automakers to more quickly introduce vehicles that use

[37] Werner, Erica and Ken Thomas. 2010. "Obama sets rules for cleaner vehicles," *The Honolulu Advertiser*, May 22, pp. A1, A2.

more advanced, cost-effective technology.[38]

The remainder of this section presents exemplary policies adopted by states that are taking strong measures to reduce fuel consumption in the ground transportation sector. The Natural Resource Defense Council (NDRC) recently identified these states in a report titled, "Fighting Oil Addiction: Ranking States' Oil Vulnerability and Solutions for Change".[39] According to this report, the 10 leading states are: (1) California; (2) Massachusetts; (3) Washington; (4) New Mexico; (5) Connecticut; (6) New York; (7) New Jersey; (8) Pennsylvania; (9) Oregon; and (10) Florida. The report classified energy-efficient transportation strategies at the state level into three categories: (1) clean cars and efficient use; (2) clean fuels; and (3) smart growth and public transit. These three categories also correspond to the major question categories of the survey questionnaire used in the SEET study.

Clean Vehicles and Efficient Use

Several states are promoting cleaner vehicles through incentives to consumers. Fifteen states offer financial incentives for hybrid-electric cars and trucks to reduce their purchase price, which is typically higher than the price of a comparable vehicle. Hybrid vehicles emit less global warming gases and use less gasoline than conventional vehicles. Automakers dramatically increased production of hybrid cars after oil prices reached nearly $150 a barrel in mid-2008.

Some states also offer usage-based incentives for hybrid vehicles. For example, the Colorado Department of Transportation (CDOT) allows owners of qualifying hybrid vehicles to apply for a permit to use high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes. Qualifying vehicles must display the required HOV or HOT exemption decal and transponder.[40] HOV lanes lose their appeal to carpoolers, once they lose their speed advantage over congested adjacent lanes. Consequently, some states are reluctant to allow single-occupant hybrids to use HOV lanes because they fear their speed advantage will be lost or diminished substantially. As a compromise, some states now allow hybrid vehicles to have two instead of three passengers to qualify for HOV lanes. Additionally, plug-in hybrids offer even greater potential for fuel savings, so some states are offering financial incentives for plug-ins. For a description of all these incentives by state, see Appendix 7 on incentives and rebates for purchase and use of fuel-efficient vehicles.

Many states are taking other actions to promote greater fuel efficiency. Thirty states, including Hawai'i, have policies mandating stronger fuel efficiency standards for the state fleet. In Hawai'i, state and county agencies must purchase light-duty vehicles that meet the needs of the agency while reducing petroleum consumption.[41] The amount of oil saved by these policies is generally not very substantial. Nevertheless, such policies conserve fuel and they do promote an

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[38] Refer to footnote 37.

[39] David Gardiner & Associates. 2009. Fighting Oil Addiction: Ranking States' Oil Vulnerability and Solutions for Change. NRDC Issue Paper. Natural Resources Defense Council, New York. [www.nrdc.org/energy/states/]

[40] CDOT. 2010. Hybrid vehicle use in the HOV/HOT lanes. Colorado Department of Transportation. [www.coloradodot.info/programs/hybrids].

[41] Hawai'i Revised Statutes 103D-412 and 196-9.

ethic of efficiency. While state-owned vehicles represent a small percentage of all registered vehicles, efficiency standards for state vehicles still represent a positive step. In addition, seventeen states, including Hawai'i, have policies restricting vehicle idling. In Hawai'i, with some exceptions, a gasoline- or diesel-powered vehicle may not idle at a loading zone, parking or service area, route terminal, or other off-street areas.[42]

Clean Fuels

California and Massachusetts are the only two states that have adopted low-carbon fuel standards (LCFS). California led the way in 2007 when Governor Arnold Schwarzenegger signed an executive order calling for the adoption of the LCFS for fuels sold in the state. The executive order seeks to reduce the global warming "intensity" of motor vehicle fuel by 10% by 2020. If this goal is achieved, California's LCFS could reduce motor vehicle petroleum consumption by an estimated 20%.[43] If that estimate is correct, the LCFS will be one of the most important policies a state can adopt to reduce oil dependence. California's LCFS is complementary to the goals set by the state's Global Warming Solutions Act of 2006 (Assembly Bill 32). Under this Act, California—the world's 12th-largest carbon emitter—will cap greenhouse gas emissions at 1990 levels by 2020, which is approximately a 25% reduction in emissions.

In July 2008, Massachusetts Governor Deval Patrick and the state congressional leadership enacted a LCFS similar to the one in California.[44] Massachusetts and several other states in the northeastern Regional Greenhouse Gas Initiative (RGGI) have committed to creating a regional LCFS.[45] Promoting low-carbon fuels supports the growth of alternatives to oil. Biofuels that are produced in a sustainable way, especially those fuels derived with cellulosic technology, along with plug-in hybrid-electric vehicles, may offer tremendous reductions in greenhouse gas emissions.

Twelve states, including Louisiana, Oregon and Hawai'i, have a renewable fuel standard or mandate. These policies require the blending of renewable fuels like biodiesel into regular fuel. It is important that states calculate lifecycle greenhouse gas emissions for biofuels to ensure that they not only save oil but also reduce greenhouse gas (GHG) emissions. In Hawai'i, state agencies are required to purchase alternative fuels and ethanol-blended gasoline when available, evaluate a purchase preference for biodiesel blends, and promote efficient operation of vehicles.[46]

Twenty states sponsor grants to support research and development of clean fuels and vehicles. These 20 states are trying to foster the technologies that will help reduce oil dependence in the

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[42] Hawai'i Administrative Rules 11-60.1-34

[43] Crane, David and Brian Prusnek. 2007. The Role of a Low Carbon Fuel Standard in Reducing Greenhouse Gas Emissions and Protecting Our Economy. California Office of the Governor, Sacramento, California.

[44] EOEEA. 2009. "Clean Energy Biofuels Act," Executive Office of Energy and Environmental Affairs, State of Massachusetts. [www.mass.gov/?pageID=eoeeaterminal&L=4&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Alternative+Fuels&L3=Clean+Energy+Biofuels+in+Massachusetts&sid=Eoeea&b=terminalcontent&f=eea_biofuels_biofuels_act&csid=Eoeea]

[45] ENS. 2009. "11 eastern states commit to regional low carbon fuel standard." Environment News Service, January 6. [www.ensnewswire.com/ens/jan2009/2009-01-06-091.asp]

[46] Hawai'i Revised Statutes 103D-412 and 196-9

near future. For example, Illinois has a Renewable Fuels Research, Development, and Demonstration Program to promote, expand the use of and accelerate commercialization of clean, renewable transportation fuels.

Smart Growth and Public Transit

'Smart growth' usually refers to a set of broad goals and policies designed to counteract endless growth on the urban fringe. According to Downs (2001), these goals and policies typically include: (1) limiting outward expansion, (2) encouraging higher density development, (3) encouraging mixed-use zoning as distinct from fully segregating land uses, (4) reducing travel by private vehicles, (5) revitalizing older areas, and (6) preserving open space. Promoting more affordable housing may or may not be an explicit goal of smart growth programs.

Smart growth seldom means 'no growth'; instead, it entails accommodating growth in a way that maximizes its benefits and reduces as much as possible its negative side effects. Smart growth implies a new way of thinking about how communities, cities and towns, and entire metropolitan regions should grow and develop. This new thinking asserts that allowing growth on the edge of urban areas can undermine a region's economy and broader environmental objectives over the long term, and may also exacerbate class divisions in society. Smart growth proponents argue that replacing farmland with development is not inevitable, but results at least in part from public policies and other factors that distort the market and facilitate the excessive decentralization of people and jobs.

States can lower oil dependence through smart growth policies that reduce sprawl and promote accessible public transit systems. To reduce sprawl, smart growth strategies focus on issues such as transportation, land use, zoning, and building codes. By concentrating growth and redevelopment within already existing urban areas and communities, states can reduce the need to develop further outside of existing cities and towns, where entirely new infrastructure (roads, buildings, etc.) must be built to accommodate growth. New development in these suburban and rural areas may also increase the distance that people commute to work.

Nineteen states, including Hawai'i, have some type of growth management act. The State of Washington's Growth Management Act (GMA) is widely considered the most comprehensive of these acts. The Washington GMA affects 29 counties (95% of Washington's population) and requires, among other conditions, policies covering sprawl reduction, affordable housing, open space and recreation, environmental protection, natural resource industries, permit processing, concentrated urban growth, regional transportation, historic lands and buildings, and public facilities and services.[47]

Only six states have set targets for reducing vehicle-miles traveled (VMT). For instance, the Washington legislature amended the state's Growth Management Act to make it even more effective at lowering oil consumption. The amendment calls for reductions in per capita VMT of 18% by 2020, 30% by 2025, and 50% by 2050. Under HB 2815-S2.FBR, the Washington State DOT, must make recommendations to the state legislature using a collaborative process with the

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[47] MRSC. 2007. *Comprehensive Planning/ Growth Management*. Municipal Research and Services Center of Washington. [www.mrsc.org/subjects/planning/compplan.aspx]

Washington State Department of Ecology and the Washington State Department of Community, Trade, and Economic Development. The recommendations must:

- Include a set of tools and best practices to assist state, regional, and local entities in making progress toward achieving VMT reductions;
- Identify current strategies to reduce VMT in Washington, as well as successful strategies in other jurisdictions;
- Identify potential new revenue options for local and regional governments to finance VMT reduction efforts;
- Include tools that measure annual progress toward these VMT benchmarks and adequately distinguish between common travel purposes;
- Establish a process to periodically evaluate the progress toward these benchmarks and recommend whether the benchmarks should be adjusted;
- Estimate the projected reductions in greenhouse gas emissions if the benchmarks are achieved;
- Examine whether affordable housing areas have access to public transit and make recommendations to ensure that these areas are adequately served by public transportation; and
- Report on the anticipated impacts of the VMT reductions prior to their implementation.

Different agencies and entities within a state influence development, sometimes in potentially contradictory ways. Most states have no agencies or mechanisms to coordinate these influences. However, fourteen states, including Hawai'i, have an office, agency or some other means to coordinate land use development. Some states have created mechanisms to coordinate public investment. For example, Massachusetts established a powerful Executive Office of Commonwealth Development in 2003.[48] Coordination of public investment is a vital first step toward true smart growth, because it enables a state to take into account the wide range of relevant influences on development. For details about the Massachusetts Executive Office of Commonwealth Development, refer to Appendix 8 on the Massachusetts Smart Growth / Smart Energy Program.

Some states align spending with climate and smart growth goals. The State of Massachusetts has a scorecard that awards points when local governments change their development rules and funding to promote more compact, mixed-use, walkable neighborhoods. Communities that score well receive access to some funding when rule changes are made, and receive access to the larger, remaining portion of funding when new development projects are permitted—tightly linking spending with results. These incentives have led directly to hundreds of changes to local zoning in the cities and towns of Massachusetts. California also has a state scorecard system.[49]

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[48] Flint, Anthony. 2006. "Agencies working together," *Boston Globe*, December 19. [www.boston.com/news/globe/editorial_opinion/oped/articles/2006/12/19/agencies_working_together/]

[49] Ewing, Reid, Keith Bartholomew, Steve Winkelman, Jerry Walters, and Don Chen with Barbara McCann and David Goldberg. 2007. *Growing Cooler: The Evidence on Urban Development and Climate Change*. Urban Land Institute, Smart Growth America, Center for Clean Air Policy, National Center for Smart Growth Research & Education.

In 2008, the California legislature passed Senate Bill 375, which attempts to put a brake on more urban sprawl by providing incentives to developers who build denser housing close to urban centers (i.e., infill development) and public transportation corridors. The bill was signed into law by Governor Arnold Schwarzenegger and has the support of environmental groups, builders, and municipal governments, but was opposed by some business groups and many Republican lawmakers. The opposition claimed that the bill would limit choices for consumers who would rather live in suburban ranch houses than urban condominiums. The law directs all 17 of California's metropolitan planning organizations (MPOs) to meet targets set by the state Air Resources Board to reduce greenhouse gas emissions. To meet these targets, regional planners must produce land-use and transportation plans that encourage smart growth. The theory is that if new residential and commercial growth is directed toward transit villages and infill projects that are closer to jobs, shopping and mass transportation, people are likely to drive significantly less. Local governments must still approve any type of new development. However, smart growth development will be first in line for state transportation funds and can be exempt from environmental impact reviews if certain conditions are met as described by Fulton.[50]

Hawai'i ranked 34th among the 50 states in terms of prioritizing public transit, according to the NRDC 2009 report. That ranking was based on the ratio of transit spending to highway spending, based on data in Highway Statistics 2007 from the Federal Highway Administration. The NRDC report indicated that many other states have prioritized funding for public transit.[51] Public transit systems—such as bus, commuter rail, subway, and light rail programs—are important components in state efforts to promote smart growth and reduce oil dependence. By creating or expanding reliable and accessible public transit programs, states can reduce the number of single-passenger cars on the road, consequently lowering average VMT. Strong public transit provides a critical transportation alternative to commuters when gas prices rise. For example, Americans nationwide drove 1.4 billion fewer highway miles in April 2008 than in April 2007 because of soaring fuel prices. To cope with these prices, many people took trains or buses instead, leading to a surge in transit ridership.[52] In 2008, public transportation saw its highest level of ridership in 52 years.[53]

States have the ability to use or "flex" certain federal funds that are ordinarily allocated for highway projects to pay for public transit programs. Those that choose not to transfer federal highway funds to transit programs may already be spending state dollars on transit. The best way to understand state transit prioritization is to compare the amount of total state spending, including flexed federal funds, on mass transit with the total spent on highway programs. By this measure, the top five states prioritizing public transit spending are New York, New Jersey, Washington, Massachusetts, and Utah.

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[50] Fulton, Bill. 2008. "SB 375 is now law -- but what will it do?" *California Planning & Development Report*. [www.cp-dr.com/node/2140]

[51] David Gardiner & Associates. 2009. Fighting Oil Addiction: Ranking States' Oil Vulnerability and Solutions for Change. NRDC Issue Paper. Natural Resources Defense Council, New York. [www.nrdc.org/energy/states/]

[52] U.S. DOT. 2008. Americans drove 1.4 billion fewer highway miles in April of 2008 than in April 2007 while fuel prices and transit ridership are both on the rise. U.S. Department of Transportation press release, June 18. [www.dot.gov/affairs/dot8408.htm]

[53] Reuters. 2009. U.S. public transit 2008 ridership highest in 52 years. March 9. [www.reuters.com/article/topNews/idUSTRE5283PD20090309?feedType=RSS&feedName=topNews]

Greater efficiency has always been a major promise of smart growth. For years, the move to more compact settlements has held out the possibility of saving taxpayers some of the cost of building infrastructure serving new development on distant farmland at the edge of population centers. Currently, state and county governments are squeezed by record budget shortfalls caused by a major recession in the nation's economy. They are looking for ways to control costs and generate revenue to jump-start the economy, given that growth rates and tax collections may remain depressed for several years. In this fiscally challenging environment, public officials need to rethink how best to serve and invest in growing communities with dwindling public dollars. In some states, public officials and smart-growth advocates are now promoting ideas such as the reuse of existing buildings, compact design to reduce infrastructure costs, and better land use planning to reduce traffic congestion.[54]

[54] Muro, Mark and Robert Puentes. 2004. Investing in a better future: A review of fiscal and competitive advantages of smarter growth development patterns. The Brookings Institution Center on Urban and Metropolitan Policy, Washington, D.C.

Future Applications and Next Steps

This report provides policy-relevant findings and recommendations, along with examples of exemplary policies and programs from other states and at the federal level that address similar goals and concerns. Additionally, while there are policy implications from the survey findings, there is also tremendous value in the raw data from a randomly selected representative sample of residents statewide, which, combined with state and local data, enables coordinated policy, planning and development to achieve the clean energy goals of the state.

The data set reported here provides detailed information on transportation behaviors and preferences of adult consumers 18 years of age and older, representing all four counties of the State of Hawai‘i—primary data which have not been collected previously. Some of the specific types of information available include transportation patterns by zip code; vehicle ownership information, including the make, model and year of vehicle; vehicle miles traveled; sensitivity to prices; new vehicle adoption rates by county; and preferences toward public transit. This information can be analyzed by demographic variables such as age, gender, income, education, and years of residence. These data can be used to inform the calibration of island-specific vehicle choice models, mode shift models, and overall transportation fuel usage.

The data collected in this study provide primary data to the State of Hawai‘i Department of Transportation, the U.S. Department of Transportation Federal Highway Administration and Federal Transit Administration, the O‘ahu Metropolitan Planning Organization, the Hawai‘i State Energy Office and the Hawai‘i Clean Energy Initiative programs of the Department of Business, Economic Development and Tourism. These organizations and others can use the data for further analyses in determining consumer preferences and developing feasible policy options and programs to reduce fossil fuel use in Hawai‘i’s ground transportation sector. While some policy directions have been suggested by the data, a more in-depth survey with a larger sample, particularly from the Neighbor Island counties, would be instructive and prove invaluable to developing sound policies and programs relating to public transportation, education on fuel-efficient vehicle and alternative fuel use, and other measures, including life style adjustments to address energy-efficient transportation throughout the state.

This study is a foundational first step. The next steps should thus build on these efforts by obtaining a larger sample, particularly from the Neighbor Island counties, and including mobile phone users; and by collecting data over time. When combined with other state and local data, these data can be used to test the various recommended policies and enable coordinated policy planning and development to achieve the energy independence goals of the state.

The Hawai‘i Energy Policy Forum will further review these data and will work with the Hawai‘i State Department of Transportation on sharing these data and results with the Hawai‘i State Energy Office and others who can assist in forwarding energy-efficient transportation strategies and actions for the state.

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Appendices

Appendix 1 **Telephone Survey Instrument**

Appendix 2 **Web Survey Instrument**

Appendix 3 **Promotional Efforts for the Web Survey**

A. List of Efforts to Promote Surveys from June 2009
B. Notice in Hawaiian Electric Company's newsletter, *ConsumerLine* (June 2009)
C. *Honolulu Advertiser* article (July 3, 2009)
D. *Pacific Business News* article (August 28, 2009)
E. Promotional link on http://www.hawaiienergypolicy.hawaii.edu/
F. Promotional flyer

Appendix 4 **Zip Code Definitions of O'ahu Geographic Districts**

Appendix 5 **Attitudes Toward Transit Oriented Development: Results of a Joint Telephone and Web-based Survey in Honolulu during Summer 2009 (Peter Flachsbart and Makena Coffman)**

Appendix 6 **Bus Ridership: Understanding Factors and Demand for Transit in Hawai'i (Gabrielle Sham)**

Appendix 7 **Incentives and Rebates for Purchase and Use of Fuel-Efficient Vehicles**

Appendix 8 **The Massachusetts Smart Growth/Smart Energy Program**

Appendix 1

Telephone Survey Instrument

HEPF 2009 TELEPHONE SURVEY
FINAL - Last modified by Wanda Kakugawa on 7/11/09

Reference No. _____

Time Ended _____
Time Started _____
Total Minutes _____

Date: _____
Interviewer Name _____ Interviewer ID _____
Respondent Name _____ Telephone _____

GREETING: Hello, good morning/afternoon/evening (Mr/Ms _____). I'm _____ from Market Trends Pacific, a professional survey research center in Hawaii. We are conducting a survey about energy use in transportation for the Public Policy Center of the University of Hawaii.

Screener Questions

S1 Are you a member of this household who is at least 18 years of age and a resident of Hawaii?

[IF YES, READ PARAGRAPH BELOW. IF NO, CONTINUE]

S2 May I please speak with a household member who is at least 18 years of age and a resident of Hawaii?

[IF SOMEONE IS AVAILABLE, REPEAT GREETING ABOVE AND QUESTION S1. IF SOMEONE QUALIFIES BUT IS NOT AVAILABLE, CONTINUE]

S3 When is a good time to call back to speak with him/her?

_____ [SET CALL BACK DATE AND TIME]

PARAGRAPH: The survey will take about 15 to 20 minutes of your time. Your answers are very important and will help us to determine how Hawaii can become more energy efficient in transportation. All of your answers will be kept completely confidential. Would you be able to help us?

[IF YES, CONTINUE]
[IF NO, THANK AND TERMINATE]

S4 Did you make <u>any</u> trips from your <u>home</u> to a destination on (NAME OF ISLAND IS DROPPED IN TO SCRIPT) <u>last week</u>? By trips I mean travel by any mode of transportation <u>including walking</u>.

[IF YES, CONTINUE]
[IF NO OR DON'T KNOW, THANK AND TERMINATE]

Questions about Vehicle Ownership and Travel Behavior

The first part of the survey is about your use and ownership of a motor vehicle.

1) Do you have a license to drive a motor vehicle?

Yes ..... 1 [CONTINUE]
No ..... 2 [GO TO Q 19]
(Refused) ..... 3 [GO TO Q 19]

2) Do you own, lease or have access to at least <u>one</u> motor vehicle in your household for personal use?

Yes ..... 1 [CONTINUE]
No ..... 2 [GO TO Q 19]
(Refused) ..... 3 [GO TO Q 19]

3) Did you drive any of these vehicles last week from home to [READ LIST]?

	Yes	No	Don't Know/Refused
A) work	1	2	9
B) a school, college or university to attend classes	1	2	9
C) drop off a child at school	1	2	9
D) a major shopping center or mall	1	2	9
E) any other destination on [NAME OF ISLAND]	1	2	9

4) [IF "Yes" to QUESTIONS 3A, 3B, 3C AND/OR 3D, CONTINUE. IF "Yes" TO ONLY QUESTION 3E, GO TO QUESTION 6. IF "No" TO ALL OF THE ABOVE, GO TO QUESTION 6.] How many minutes did it usually take you to make the trip from home to [INSERT TRIP PURPOSE FROM Q3] last week? Please do not include any time walking to and from your vehicle at each end of the trip. [DO NOT READ LIST BELOW. RECORD ONLY ONE ANSWER FOR EACH TRIP PURPOSE.]

	4A Work	4B Attend School	4C Drop off a child at school	4D Shopping Center
Less than 5 minutes	1	1	1	1
5 to 9 minutes	2	2	2	2
10 to 14 minutes	3	3	3	3
15 to 19 minutes	4	4	4	4
20 to 24 minutes	5	5	5	5
25 to 29 minutes	6	6	6	6
30 to 34 minutes	7	7	7	7
35 to 39 minutes	8	8	8	8
40 to 44 minutes	9	9	9	9
45 to 59 minutes	10	10	10	10
60 to 89 minutes	11	11	11	11
90 or more minutes	12	12	12	12
Did not make this trip last week	13	13	13	13
Destination of trip varied from day to day	14	14	14	14
Can't Recall/Don't know/Refused)	15	15	15	15

5) How many trips did you make in your vehicle from home to _____ last week? [READ LIST]

	# of trips	Can't Recall/Don't know/Refused
A) work to earn an income	_____	999
B) a school, college or university to attend classes	_____	999
C) drop off a child at school	_____	999
D) a major shopping center or mall	_____	999

6) How many motor vehicles do you own, lease or have access to in your household?

1 vehicle....1
2 vehicles....2
3 vehicles....3
4 vehicles....4
5 vehicles....5
6 vehicles....6
7 vehicles....7
8 vehicles....1
9 vehicles....2
10 vehicles....3

11 vehicles.....4
12 vehicles.....5
(Other amount).....88
(Don't know/refused).....99

7) Of those vehicles, was there one vehicle that you used for most of the trips that you made last week?

Yes..... 1 [CONTINUE]
No..... 2 [GO TO Q 19]
(Can't recall/Don't know/Refused) ..... 3 [GO TO Q 19]

8) What type of vehicle was it? [IF UNABLE TO GIVE AN ANSWER, SAY:] Here are possible answers. Please stop me when I reach the correct one.

Passenger car 1
Van.....2
Sport utility vehicle 3
Truck 4
Motorcycle, motor scooter, moped, etc.....5
Another type of vehicle (SPECIFY: _____) 6
(Don't know/Refused) 7

9) Approximately, how many miles per gallon does this vehicle get on average?

MILES PER GALLON: _____ [99 = DON'T KNOW/REFUSED]

10) What was the make of this vehicle (e.g., Toyota)? _____ [USE CODES]

11) What was the model of this vehicle (e.g., Corolla)? _____

12) What was the model year of this vehicle? _____

13) Did you drive this vehicle in 2008?

Yes..... 1 [CONTINUE]
No..... 2 [GO TO Q 15]
(Don't know/Refused) ..... 3 [GO TO Q 15]

14) Approximately how many miles did you drive this vehicle in 2008?

MILES DRIVEN IN 2008: _____

[IF UNABLE TO GIVE AN ANSWER, SAY:] Here are possible answers. Please stop me when I reach the correct one.

0 miles.....1
1 to 5,000 miles 2
5,001 to 10,000 miles.....3
10,001 to 15,000 miles.....4
15,001 to 20,000 miles.....5
More than 20,000 miles 6
(Can't Recall/Don't know/Refused) 7

15) In 2008, gasoline prices went above $4 a gallon. Did this cause you to reduce the number of miles that you drove in 2008?

Yes..... 1
No..... 2

Maybe or not sure 3
(Can't Recall/Don' know/Refused) 4

16) Some people reported doing a number of things to cope with higher gasoline prices last year. Did you do anything to cope with higher gas prices?

Yes ..... 1 [CONTINUE]
No ..... 2 [GO TO Q 19]
(Can't Recall/Don't know/Refused) ..... 3 [GO TO Q 19]

17) What things did you do? [DO NOT READ LIST. RECORD ALL ANSWERS GIVEN. IF RESPONDENT PAUSES, SAY: Anything else?]

Combined errands ..... 1 [CONTINUE]
Checked the tires for proper inflation ..... 2 [CONTINUE]
Reduced my average driving speed to increase fuel economy ..... 3 [CONTINUE]
Shopped at stores closer to home ..... 4 [CONTINUE]
Joined a carpool or vanpool ..... 5 [CONTINUE]
Took the public bus, on your island, more often ..... 6 [CONTINUE]
Used a bicycle more often ..... 7 [CONTINUE]
Walked more often ..... 8 [CONTINUE]
Worked at home more often ..... 9 [CONTINUE]
Purchased a more fuel-efficient vehicle ..... 10 [CONTINUE]
Spent less money on other goods and services ..... 11 [CONTINUE]
Other (SPECIFY: _____)12 [CONTINUE]
(Can't recall/Don't know/Refused) ..... 13 [GO TO Q 19]

18A) [IF ONE THING IN Q17, ASK] Are you still doing this today?

Yes ..... 1 [GO TO Q 19]
No ..... 2 [GO TO Q 19]
(Can't Recall/Don't know/Refused) ..... 3 [GO TO Q 19]

18B) [IF 2+ THINGS IN Q17, ASK] How many of these things are you still doing? Would you say…? [READ LIST.]

most of them 1
some of them 2
none of them 3
(Don't know/Refused) 4

19) Did you ride [TheBus/The Kauai Bus/The Maui Bus/Hele On] for any trip that you made last week? Please include trips that began at home as well as those that began elsewhere.

Yes ..... 1 [CONTINUE]
No ..... 2 [CONTINUE]
(Can't Recall/Don't know/Refused) ..... 3 [CONTINUE]

20) [ASK EVERYONE] What would it take for you to ride [TheBus/The Kauai Bus/The Maui Bus/Hele On] more often? [DO NOT READ LIST. RECORD ALL ANSWERS GIVEN. WHEN FINISHED, SAY: Anything else?]

More frequent service 1
More convenient bus stops 2
More reliable service 3
A faster ride 4
A lower or free fare 5
Less crowded buses 6

More comfortable seats 7
Other (SPECIFY: _____)...8
Nothing would motivate me to take a bus.....9
(Don't know/Refused) 10

21) [ASK EVERYONE] Whether you ride the bus or not, how long would it take for you to walk from home to the nearest bus stop in your neighborhood? Would you say…? [READ LIST.]

Less than 5 minutes 1
About 5 to 10 minutes 2
More than 10 minutes 3
Not sure 4
(Refused) 5

Questions about the Future

The next part of the survey is about what you might do in the future.

22) In the next three years, do you expect to buy or lease a motor vehicle for your personal use or the use of another member of your household? Would you say…? [READ LIST.]

Yes	1	[CONTINUE]
No	2	[GO TO Q 27]
Maybe	3	[CONTINUE]
(Don't know/No answer)	4	[GO TO Q 27]

23) What factor would be most important to you in choosing your next vehicle? Would you say…? [READ LIST]

dependability 1
fuel economy 2
ability to run on different kinds of fuel (in other words, fuel flexibility)..... 3
low price 4
quality..... 5
safety..... 6
none of these 7
(Don't know/Refused) 8

24) When you buy or lease your next vehicle, how likely are you to buy a hybrid gas-electric vehicle (like a Toyota Prius)? Would you say…? [READ LIST]

very likely 1
somewhat likely 2
not likely at all 3
(Don't know/Refused) 4

25) I am going to read a list of reasons given by some people for buying a more fuel-efficient vehicle. Please tell me if any of them would help to persuade you to buy a more fuel-efficient vehicle. [READ LIST.]

	Yes	No	Maybe	Don't know/Refused
A) A tax credit to offset the higher initial cost of the vehicle	1	2	3	9
B) More cash for the vehicle you trade in……	1	2	3	9
C) Free or preferential parking at work	1	2	3	9
D) Permission to use high-occupancy vehicle or HOV lanes	1	2	3	9
E) Higher gas prices than currently exist	1	2	3	9
F) Some other reason (SPECIFY: _____)	1	DOES NOT APPLY		

26) Some people predict that gas prices in the future will be higher than they are now. What price of gasoline would motivate you to consider buying a more fuel-efficient vehicle? [IF UNABLE TO GIVE AN ANSWER, SAY:] Here are possible answers. Please stop me when I reach your answer. [READ LIST.]

$3.00 per gallon.....1
$3.50 per gallon.....2
$4.00 per gallon.....3
$4.50 per gallon.....4
$5.00 per gallon.....5
$6.00 per gallon.....7
$7.00 per gallon.....8
$8.00 per gallon.....9
$9.00 per gallon.....10
$10.00 per gallon.....11
None of the above.....12
(Don't know/Refused) 13

27) Some people think that fuels such as biodiesel and ethanol may replace gasoline someday. Would you say that you are very familiar, somewhat familiar, or not familiar with biodiesel and ethanol fuels for motor vehicles?

Very	1	[CONTINUE]
Somewhat	2	[CONTINUE]
Not familiar	3	[GO TO Q 30]
(Don't know/Refused)	4	[GO TO Q 30]

28) Would you consider buying or leasing a vehicle that is able to run primarily on biodiesel or ethanol fuels? Would you say…? [READ LIST.]

Yes	1	[CONTINUE]
No	2	[GO TO Q 30]
Maybe	3	[CONTINUE]
(Don't know/Refused)	4	[GO TO Q 30]

29) Of these fuels, would you prefer to use…? [READ LIST]

ethanol E85, meaning that 85% of the fuel is ethanol 1
biodiesel.....2
or do you have no preference 3
(Don't know/Not sure/Refused) 4

30) [IF RESPONDENT CHOSE "Work" IN QUESTION 3A OR "School" IN QUESTION 3B, ASK QUESTIONS 30 THROUGH 34. FOR ALL OTHER RESPONDENTS, GO TO QUESTION 35.]

You said earlier that you commuted from home to work or to school last week using a motor vehicle. If the price of gas were to rise and stay above $4 per gallon, would you do any of the following things to save money, if they were available to you? [READ LIST.]

	Yes	No	Maybe	Don't know/Refused
A) Look for a place to live closer to work or school	1	2	3	9
B) Work from home more often using a computer to communicate	1	2	3	9
C) Switch to a four-day work week if possible	1	2	3	9
D) Look for a comparable job or school that would require a shorter commute or less driving	1	2	3	9
E) Use the public bus, on your island, or other public transportation	1	2	3	9
F) Do anything else? (SPECIFY: _____)	1	2	3	9
G) Do nothing, just pay higher gas prices	1	2	3	9

31) [IF RESPONDENT SAID "Yes" OR "Maybe" TO QUESTION 30A, ASK:] Suppose that you found a new place to live with a shorter commute that satisfied you. Let's also suppose that your new place differs from your present home in some respects. Would you still be willing to live in this new place if it…? [REPEAT "Would you still be willing etc." AS YOU READ LIST.]

	Yes	No	Maybe	Don't know/Refused
A) has less space than your present home	1	2	3	9
B) has a common area for children to play	1	2	3	9
C) is located in a more densely populated area	1	2	3	9
D) is located in an apartment within walking distance of food, drug and other retail stores.	1	2	3	9
E) is located in a building that has professional offices or small retail stores	1	2	3	9
F) (NEIGHBOR ISLANDS ONLY) is close to a bus stop	1	2	3	9
G) (OAHU ONLY) is close to a bus or a potential rail transit stop	1	2	3	9
H) has less space to park your vehicle, but you could walk or ride your bicycle more often	1	2	3	9

31a_1) [IF RESPONDENT SAID "Yes" OR "Maybe" TO QUESTION 31A, ASK:] How much interior living space does your present home have? Does it have…[READ LIST]

Less than 1,000 square feet 1
1,000 to 1,500 square feet 2
1,501 to 2,000 square feet 3
2,001 to 2,500 square feet 4
Over 2,500 square feet 3
(Don't know/Refused) 4

32) Suppose your employer or school allowed you to work or take classes at home using your computer at least two days per week. Would that encourage you to look for a nicer place to live that is farther away from work or school than your present location? Would you say…? [READ LIST.]

Yes 1
No 2
Maybe 3
(Don't know/Refused) 4

33) Do you have to pay for parking where you work or attend school?

Yes ..... 1 [CONTINUE]
No ..... 2 [GO TO Q 35]
(Don't know/Refused) ..... 3 [GO TO Q 35]

34) If the price of parking doubled where you work or attend school, would you use the public bus, on your island, instead of your vehicle to commute? Would you say…? [READ LIST.]

Yes 1
No 2
Maybe 3
(Don't know/Refused) 4

35) [IF RESPONDENT IS A RESIDENT OF O'AHU, ASK QUESTIONS 35, 36, AND 37.] The City and County of Honolulu is planning to build a rail transit system from Kapolei to the Ala Moana Shopping Center. The city expects to complete construction of this system in 2018. Will this transit system provide service to your community or the general area where you live? Would you say…? [READ LIST.]

Yes .....1 [CONTINUE]
No .....2 [GO TO Q 37]
Not sure .....3 [CONTINUE]
(Don't know/Refused) .....4 [GO TO Q 37]

36) Suppose the rail transit system were in operation now and that the price of gasoline was and stayed above $4 per gallon. Do you think you would use the rail system for <u>some</u> of the trips you make? Would you say…? [READ LIST.]

Yes 1
No 2
Maybe 3
(Don't know/Refused) 4

37) Does the idea of living in a neighborhood within convenient walking distance of a rail transit stop appeal to you? Would you say…? [READ LIST.]

Yes 1
No 2
Maybe 3
(Don't know/Refused) 4

Demographic Questions

The next few questions are for classification purposes only.

D1) How many years have you lived in Hawaii? [IF UNABLE TO GIVE AN ANSWER, SAY:] Here are possible answers. Please stop me when I reach the correct one. [READ LIST.]

Less than a year 1
One to four years 2
Five to nine years 3
10 to 19 years 4
20 years or more 5
All my life 6
(Don't know/Refused) 7

D2) What is the zip code of your current address? _____ [99999 = DON'T KNOW]

[IF DON'T KNOW, ASK:] In what area of Oahu/the island do you live? _____

D3) Do you presently live in a single-family detached house, a townhouse, a condominium, an apartment, or another type of dwelling?

A single-family detached house 1
A townhouse 2
A condominium 3
An apartment 4
Another type of dwelling (SPECIFY: _____) ...5
Other (SPECIFY) 6
(Don't know/Refused) 7

D4) Do you presently own or rent the place where you live?

Own.....1
Rent.....2
(Occupy space without paying rent).....3
(Other SPECIFY:_____)....4
(Don't know/Refused) 5

D5) Did you do any of the following activities last week? Did you…? [READ LIST.]

	Yes	No	Don't Know
A) work full or part time for pay at a location outside your home	1	2	3
B) attend classes at a school, college or university as a full or part-time student	1	2	3
C) work at home for pay	1	2	3
D) keep house and/or take care of children at home	1	2	3
E) take a vacation or trip out of town	1	2	3
F) mainly stay at home	1	2	3
G) or do something else (SPECIFY: _____)	1	2	3
H) (Refused/No answer)	1	2	3

D6) [IF THE ANSWER TO QUESTION D5A IS "Yes", ASK QUESTIONS D6 AND D7. IF THE ANSWER TO QUESTION D5B IS "Yes", GO TO QUESTION D8. IF RESPONDENT SAID "No" TO QUESTIONS D5A AND D5B, GO TO QUESTION D9.]

What is the zip code of your primary place of work? _____(99999 = DON'T KNOW)

[IF DON'T KNOW, ASK:] In what area of Oahu/the island do you work? _____

D7) Do you have more than one job?

Yes 1
No..... 2
(Don't know/Refused) 3

D8) [IF RESPONDENT ATTENDS CLASSES AT A SCHOOL, COLLEGE OR UNIVERSITY, ASK:] What is the zip code of the school, college or university where you attend classes?

ZIP CODE OF SCHOOL: _____ [99999 = DON'T KNOW]

[IF DON'T KNOW, ASK:] Where is the school located? _____

D9) Including yourself, how many people live with you at home?

HOUSEHOLD SIZE: _____ [IF ONE PERSON, GO TO Q D12.]
[99 = DON'T KNOW/REFUSED]

D10) Including yourself, how many of these people have a license to drive?

NUMBER OF LICENSED DRIVERS: _____ [99 = DON'T KNOW]

D11) [IF MORE THAN 1 IN D9, ASK] How many of them are children under the age of 18 years?

NUMBER OF CHILDREN UNDER 18: _____ [99 = DON'T KNOW/REFUSED]

D12) What is the last grade in school that you completed? [IF UNABLE TO GIVE AN ANSWER, SAY:] Here are possible answers. Please stop me when I reach the correct one. [READ LIST.]

Less than high school 1
High school graduate 2
Business/trade school.....3
Some college.....4
College graduate 5
Post college graduate 6
(Don't know/Refused) 7

D13) What year were you born? _____ [9999 = REFUSED]

D14) What is your race or ethnicity? [IF MORE THAN ONE, ASK:] With which category do you identify with the most? [DO NOT READ LIST.]

Caucasian.....1
Chinese.....2
Filipino.....3
Hawaiian/Part-Hawaiian 4
Japanese 5
Korean 6
African American 7
Other 8
Mixed (not Hawaiian) 9
(Don't know/Refused) 10

D15) What was your total family income, before taxes, for 2008? I'll read some possible categories. Please stop me when I reach the correct one. [READ LIST.]

Less than $25,000.....1
$25,000 but less than $35,000 2
$35,000 but less than $50,000 3
$50,000 but less than $75,000 4
$75,000 but less than $100,000.....5
$100,000 or over 6
[DO NOT ASK] Don't Know 7
[DO NOT ASK] Refused 8

D16) Gender [DO NOT ASK.]

Male 1
Female 2

In the event my supervisor would like to verify this interview, may I have your first name please?

NAME: _____

Would you like the name and phone number of the principal investigator or the office overseeing this survey at the University of Hawaii? [IF THE ANSWER IS YES, SAY:]

Dr. Sharon Miyashiro of the Public Policy Center at 956-7070 or
Committee on Human Subjects at 956-5007

That was my last question. Thank you very much for your help in completing this important survey.

Appendix 2

Web Survey Instrument

1. Introduction

We need your kokua!

Thank you for agreeing to participate in the Hawaii Energy Policy Forum's (HEPF) survey of consumer attitudes, behaviors, and preferences on energy-efficient transportation strategies in Hawaii.

Your participation in this study is very important. Your responses will assist HEPF in planning and developing public policy proposals and initiatives related to efficient energy use in the ground transportation sector. Your responses will be strictly confidential; all information from the study will be presented in the aggregate, no individual responses will be used.

Market Trends Pacific, a Hawaii based market research firm, is conducting the survey. If you have any questions about this survey, please call Dr. Sharon Miyashiro of the Public Policy Center at 956-7070 or Committee on Human Subjects at 956-5007.

NOTE:
-If you would like to start the survey, save it, and complete it at a later time, simply click the "Next" button at the bottom of the screen. To return to the survey, be sure to use the same computer and go to http://survey.claritykit.com. Your previous responses will be saved and you may complete the remainder of the survey.

-Some questions require a response. These questions are denoted by an asterisk (*).

2. General

*** 1. Are you at least 18 years of age and a resident of Hawaii?**

- ◯ Yes
- ◯ No

3. General

*** 2. Did you make any trips from your home to a destination on your island last week? By trips I mean travel by any mode of transportation including walking.**

- ◯ Yes
- ◯ No

4. Vehicle Ownership and Travel Behavior

The first part of the survey is about your use and ownership of a motor vehicle.

3. Do you have a license to drive a motor vehicle?

- ◯ Yes
- ◯ No

5. Vehicle Ownership and Travel Behavior

4. Do you own, lease or have access to at least one motor vehicle in your household for personal use?

- ◯ Yes
- ◯ No

6. Vehicle Ownership and Travel Behavior

*** 5. Did you drive any of these vehicles last week from home to work?**

- ◯ Yes
- ◯ No

7. Vehicle Ownership and Travel Behavior

6. How many minutes did it usually take you to make the trip from home to work last week? Please do not include any time walking to and from your vehicle at each end of the trip.

- ◯ Less than 5 minutes
- ◯ 5 to 9 minutes
- ◯ 10 to 14 minutes
- ◯ 15 to 19 minutes
- ◯ 20 to 24 minutes
- ◯ 25 to 29 minutes
- ◯ 30 to 34 minutes
- ◯ 35 to 39 minutes
- ◯ 40 to 44 minutes
- ◯ 45 to 59 minutes
- ◯ 60 to 89 minutes
- ◯ 90 or more minutes
- ◯ Did not make this trip last week
- ◯ Destination of trip varied from day to day

7. How many trips did you make in your vehicle from home to work to earn an income last week?

8. Vehicle Ownership and Travel Behavior

*** 8. Did you drive any of these vehicles last week from home to a school, college or university to attend classes?**

- ◯ Yes
- ◯ No

9. Vehicle Ownership and Travel Behavior

9. How many minutes did it usually take you to make the trip from home to a school, college or university to attend classes last week? Please do not include any time walking to and from your vehicle at each end of the trip.

- ◯ Less than 5 minutes
- ◯ 5 to 9 minutes
- ◯ 10 to 14 minutes
- ◯ 15 to 19 minutes
- ◯ 20 to 24 minutes
- ◯ 25 to 29 minutes
- ◯ 30 to 34 minutes
- ◯ 35 to 39 minutes
- ◯ 40 to 44 minutes
- ◯ 45 to 59 minutes
- ◯ 60 to 89 minutes
- ◯ 90 or more minutes
- ◯ Did not make this trip last week
- ◯ Destination of trip varied from day to day

10. How many trips did you make in your vehicle from home to a school, college or university to attend classes last week?

[ ]

10. Vehicle Ownership and Travel Behavior

*** 11. Did you drive any of these vehicles last week from home to drop off a child at school?**

- ◯ Yes
- ◯ No

11. Vehicle Ownership and Travel Behavior

12. How many minutes did it usually take you to make the trip from home to drop off a child at school last week? Please do not include any time walking to and from your vehicle at each end of the trip.

- ◯ Less than 5 minutes
- ◯ 5 to 9 minutes
- ◯ 10 to 14 minutes
- ◯ 15 to 19 minutes
- ◯ 20 to 24 minutes
- ◯ 25 to 29 minutes
- ◯ 30 to 34 minutes
- ◯ 35 to 39 minutes
- ◯ 40 to 44 minutes
- ◯ 45 to 59 minutes
- ◯ 60 to 89 minutes
- ◯ 90 or more minutes
- ◯ Did not make this trip last week
- ◯ Destination of trip varied from day to day

13. How many trips did you make in your vehicle from home to drop off a child at school last week?

[ ]

12. Vehicle Ownership and Travel Behavior

*** 14. Did you drive any of these vehicles last week from home to a major shopping center or mall (like Ala Moana, Pearlridge, etc.)**

- ◯ Yes
- ◯ No

13. Vehicle Ownership and Travel Behavior

15. How many minutes did it usually take you to make the trip from home to a major shopping center or mall last week? Please do not include any time walking to and from your vehicle at each end of the trip.

- ◯ Less than 5 minutes
- ◯ 5 to 9 minutes
- ◯ 10 to 14 minutes
- ◯ 15 to 19 minutes
- ◯ 20 to 24 minutes
- ◯ 25 to 29 minutes
- ◯ 30 to 34 minutes
- ◯ 35 to 39 minutes
- ◯ 40 to 44 minutes
- ◯ 45 to 59 minutes
- ◯ 60 to 89 minutes
- ◯ 90 or more minutes
- ◯ Did not make this trip last week
- ◯ Destination of trip varied from day to day

16. How many trips did you make in your vehicle from home to a major shopping center or mall last week?

[ ]

14. Vehicle Ownership and Travel Behavior

17. Did you drive any of these vehicles last week from home to any other destination on your island?

- ◯ Yes
- ◯ No

18. How many motor vehicles do you own, lease or have access to in your household?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10
- ◯ 11
- ◯ 12
- ◯ More than 12

15. Vehicle Ownership and Travel Behavior

19. Please enter the number of motor vehicles you own, lease, or have access to in your household.

[ ]

16. Vehicle Ownership and Travel Behavior

20. Of those vehicles, was there one vehicle that you used for most of the trips that you made last week?

- ◯ Yes
- ◯ No

17. Vehicle Ownership and Travel Behavior

21. What type of vehicle was it?

- ◯ Passenger car
- ◯ Van
- ◯ Sports Utility Vehicle
- ◯ Truck
- ◯ Motorcycle, motor scooter, moped
- ◯ Another type of vehicle

18. Vehicle Ownership and Travel Behavior

22. Please specify the type of vehicle.

19. Vehicle Ownership and Travel Behavior

23. Approximately, how many miles per gallon does this vehicle get on average?

24. What was the make of this vehicle (e.g., Toyota)?

25. What was the model of this vehicle (e.g., Corolla)?

26. What was the model year of this vehicle?

27. Did you drive this vehicle in 2008?

- ◯ Yes
- ◯ No

20. Vehicle Ownership and Travel Behavior

28. Approximately how many miles did you drive this vehicle in 2008?

- ◯ 0 miles
- ◯ 1 to 5,000 miles
- ◯ 5,001 to 10,000 miles
- ◯ 10,001 to 15,000 miles
- ◯ 15,001 to 20,000 miles
- ◯ More than 20,000 miles

21. Vehicle Ownership and Travel Behavior

29. In 2008, gasoline prices went above $4 a gallon. Did this cause you to reduce the number of miles that you drove in 2008?

- ◯ Yes
- ◯ No
- ◯ Maybe or not sure

30. Some people reported doing a number of things to cope with higher gasoline prices last year. Did you do anything to cope with higher gas prices?

- ◯ Yes
- ◯ No

22. Vehicle Ownership and Travel Behavior

31. What things did you do?

- [ ] Combined errands
- [ ] Checked the tires for proper inflation
- [ ] Reduced my average driving speed to increase fuel economy
- [ ] Shopped at stores closer to home
- [ ] Joined a carpool or vanpool
- [ ] Took the public bus, on my island, more often
- [ ] Used a bicycle more often
- [ ] Walked more often
- [ ] Worked at home more often
- [ ] Purchased a more fuel-efficient vehicle
- [ ] Spent less money on other goods and services

Other (please specify)

23. Vehicle Ownership and Travel Behavior

32. Are you still doing these things today?

- ◯ Yes
- ◯ No

33. How many of these things are you still doing?

- ◯ Most of them
- ◯ Some of them
- ◯ None of them
- ◯ Not applicable

24. Vehicle Ownership and Travel Behavior

34. Did you ride the public bus, on your island, for any trip that you made last week? Please include trips that began at home as well as those that began elsewhere.

- ◯ Yes
- ◯ No

35. What would it take for you to ride the public bus, on your island, more often?

- [ ] More frequent service
- [ ] More convenient bus stops
- [ ] More reliable service
- [ ] A faster ride
- [ ] A lower or free fare
- [ ] Less crowded buses
- [ ] More comfortable seats
- [ ] Nothing would motivate me to take a bus

Other (please specify)

25. Vehicle Ownership and Travel Behavior

36. Whether you ride the bus or not, how long would it take for you to walk from home to the nearest bus stop in your neighborhood?

- ◯ Less than 5 minutes
- ◯ About 5 to 10 minutes
- ◯ More than 10 minutes
- ◯ Not sure

26. Questions about the Future

The next part of the survey is about what you might do in the future.

37. In the next three years, do you expect to buy or lease a motor vehicle for your personal use or the use of another member of your household?

- ◯ Yes
- ◯ No
- ◯ Maybe

27. Questions about the Future

38. What factor would be most important to you in choosing your next vehicle?

- ◯ Dependability
- ◯ Fuel Economy
- ◯ Ability to run on different kinds of fuel (in other words, fuel flexibility)
- ◯ Low Price
- ◯ Quality
- ◯ Safety
- ◯ None of these

39. When you buy or lease your next vehicle, how likely are you to buy a hybrid gas-electric vehicle (like a Toyota Prius)?

- ◯ Very Likely
- ◯ Somewhat Likely
- ◯ Not At All Likely

40. Below is a list of reasons given by some people for buying a more fuel-efficient vehicle. Please indicate if any of them would help to persuade you to buy a more fuel-efficient vehicle.

	Yes	No	Maybe
A tax credit to offset the higher initial cost of the vehicle	◯	◯	◯
More cash for the vehicle you trade in	◯	◯	◯
Free or preferential parking at work	◯	◯	◯
Permission to use high-occupancy vehicle or HOV lanes	◯	◯	◯
Higher gas prices than currently exist	◯	◯	◯

41. Are there any other reasons not listed in the previous question that would help persuade you to buy a more fuel-efficient vehicle?

42. Some people predict that gas prices in the future will be higher than they are now. What price of gasoline would motivate you to consider buying a more fuel-efficient vehicle?

- ◯ $3.00 per gallon
- ◯ $3.50 per gallon
- ◯ $4.00 per gallon
- ◯ $4.50 per gallon
- ◯ $5.00 per gallon
- ◯ $6.00 per gallon
- ◯ $7.00 per gallon
- ◯ $8.00 per gallon
- ◯ $9.00 per gallon
- ◯ $10.00 per gallon
- ◯ None of the above

28. Questions about the Future

43. Some people think that fuels such as biodiesel and ethanol may replace gasoline someday. Would you say that you are very familiar, somewhat familiar, or not familiar with biodiesel and ethanol fuels for motor vehicles?

- ◯ Very
- ◯ Somewhat
- ◯ Not familiar

29. Questions about the Future

44. Would you consider buying or leasing a vehicle that is able to run primarily on biodiesel or ethanol fuels?

- ◯ Yes
- ◯ No
- ◯ Maybe

30. Questions about the Future

45. Of these fuels, would you prefer to use...

- ◯ Ethanol E85, meaning that 85% of the fuel is ethanol
- ◯ Biodiesel
- ◯ No Preference

31. Questions about the Future

46. If the price of gas were to rise and stay above $4 per gallon, would you look for a place to live closer to work or school to save money?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable

32. Questions about the Future

Suppose that you found a new place to live with a shorter commute that satisfied you. Let's also suppose that your new place differs from your present home in some respects.

47. Would you still be willing to live in this new place if it has less space than your present home?

- ◯ Yes
- ◯ No
- ◯ Maybe

33. Questions about the Future

48. How much interior living space does your present home have?

- ◯ Less than 1000 square feet
- ◯ 1000 to 1500 square feet
- ◯ 1501 to 2000 square feet
- ◯ 2001 to 2500 square feet
- ◯ More than 2500 square feet

34. Questions about the Future

49. Would you still be willing to live in this new place if it has a common area for children to play? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe

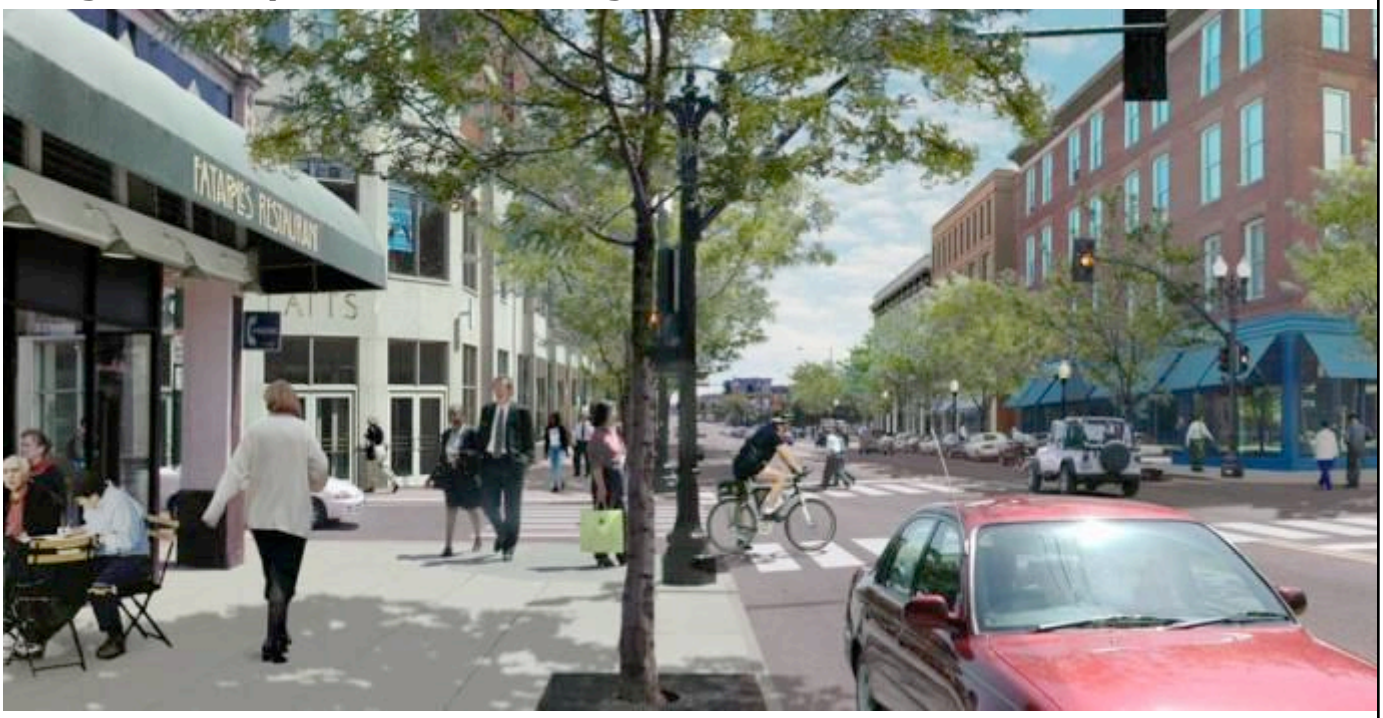
Image courtesy of Urban Advantage

35. Questions about the Future

50. Would you still be willing to live in this new place if it is located in a more densely populated area? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe

Image courtesy of Urban Advantage



36. Questions about the Future

51. Would you still be willing to live in this new place if it is located in an apartment within walking distance of food, drug and other retail stores? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe

Image courtesy of Urban Advantage

37. Questions about the Future

52. Would you still be willing to live in this new place if it is located in a building that has professional offices or small retail stores? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe

Image courtesy of Urban Advantage

38. Questions about the Future

53. If you live on the Big Island, Kauai, or Maui: Would you still be willing to live in this new place if it is close to a bus stop? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable - I live on Oahu

Image courtesy of Urban Advantage

39. Questions about the Future

54. If you live on Oahu: Would you still be willing to live in this new place if it is close to a bus or potential rail transit stop? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable - I live on the Big Island, Kauai, or Maui

Image courtesy of Urban Advantage

40. Questions about the Future

55. Would you still be willing to live in this new place if it has less space to park your vehicle, but you could walk or use a bicycle more often? The image below shows an illustration.

- ◯ Yes
- ◯ No
- ◯ Maybe

Image courtesy of Urban Advantage

41. Questions about the Future

56. If the price of gas were to rise and stay above $4 per gallon, would you do any of the following things to save money, if they were available to you?

	Yes	No	Maybe	Not Applicable
Work from home more often using a computer to communicate	○	○	○	○
Switch to a four-day work week if possible	○	○	○	○
Look for a comparable job or school that would require a shorter commute or less driving	○	○	○	○
Use the public bus on your island	○	○	○	○
Do nothing, just pay higher gas prices	○	○	○	○

57. If the price of gas were to rise and stay above $4 per gallon, is there anything else you would do that is not mentioned in the previous question?

58. Suppose your employer or school allowed you to work or take classes at home using your computer at least two days per week. Would that encourage you to look for a nicer place to live that is farther away from work or school than your present location?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable

59. Do you have to pay for parking where you work or attend school?

- ◯ Yes
- ◯ No
- ◯ Not Applicable

42. Questions about the Future

60. If the price of parking doubled where you work or attend school, would you use the public bus, on your island, instead of your vehicle to commute?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable

43. Questions about the Future

61. If you live on Oahu: The City and County of Honolulu is planning to build a rail transit system from Kapolei to the Ala Moana Shopping Center. The city expects to complete construction of this system in 2018. Will this transit system provide service to your community or the general area where you live?

- ◯ Yes
- ◯ No
- ◯ Not sure
- ◯ Not Applicable - I live on the Big Island, Kauai, or Maui

44. Questions about the Future

62. If you live on Oahu: Suppose the rail transit system were in operation now and that the price of gasoline was and stayed above $4 per gallon. Do you think you would use the rail system for some of the trips you make?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable - I live on the Big Island, Kauai, or Maui

45. Questions about the Future

63. If you live on Oahu: Does the idea of living in a neighborhood within convenient walking distance of a rail transit stop appeal to you?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not Applicable - I live on the Big Island, Kauai, or Maui

46. Demographic Questions

64. How many years have you lived in Hawaii?

- ◯ Less than a year
- ◯ 1 to 4 years
- ◯ 5 to 9 years
- ◯ 10 to 19 years
- ◯ 20 years or more
- ◯ All my life

65. What is the zip code of your current address?

66. If you do not know the zip code of your home, please tell us in which area of the island you live.

67. Do you presently live in a single-family detached house, a townhouse, a condominium, an apartment, or another type of dwelling?

- ◯ Single-family detached house
- ◯ A townhouse
- ◯ A condominium
- ◯ An apartment
- ◯ Another type of dwelling

68. Do you presently own or rent the place where you live?

- ◯ Own
- ◯ Rent

Other (please specify)

69. Did you work full or part time for pay at a location outside your home last week?

- ◯ Yes
- ◯ No

47. Demographics Questions

70. What is the zip code of your primary place of work?

71. If you do not know the zip code of your place of work, please tell us in which area of the island you work.

72. Do you have more than one job?

- Yes
- No

48. Demographics Questions

73. Did you attend classes at a school, college or university as a full or part-time student last week?

- Yes
- No

49. Demographics Questions

74. What is the zip code of the school, college or university where you attend classes?

75. If you do not know the zip code of the school, college or university where you attend classes, please tell us where the school is located.

50. Demographics Questions

76. Did you do any of the following activities last week? Did you...

	Yes	No
Work at home for pay		
Keep house and/or take care of children at home		
Take a vacation or trip out of town		
Mainly stay at home		

Other (please specify)

51. Demographics Questions

77. Including yourself, how many people live with you at home?

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10

Other (please specify)

52. Demographics Questions

78. Of everyone living in your household, how many of these people have a license to drive?

79. Of everyone living in your household, how many of them are children under the age of 18 years?

53. Demographics Questions

80. What is the last grade in school that you completed?

- ◯ Less than high school
- ◯ High school graduate
- ◯ Business/trade school
- ◯ Some college
- ◯ College graduate
- ◯ Post college graduate

81. What year were you born?

82. What is your race or ethnicity?

- ◯ Caucasian
- ◯ Chinese
- ◯ Filipino
- ◯ Hawaiian/Part-Hawaiian
- ◯ Japanese
- ◯ Korean
- ◯ African American
- ◯ Other
- ◯ Mixed (not Hawaiian)

83. What was your total family income, before taxes, for 2008?

- ◯ Less than $25,000
- ◯ $25,000 but less than $35,000
- ◯ $35,000 but less than $50,000
- ◯ $50,000 but less than $75,000
- ◯ $75,000 but less than $100,000
- ◯ $100,000 or over

84. What is your gender?

- ◯ Male
- ◯ Female

54. Thank You

Those are all the questions that we have for you. Thank you for taking the time to participate in this very important survey.

Appendix 3

Promotional Efforts for Web Survey

Appendix 3a. List of Efforts to Promote Surveys from June 2009

Appendix 3b. Notice in HECO's newsletter, *ConsumerLine* (June 2009)

Appendix 3c. *Honolulu Advertiser* article (July 3, 2009)

Appendix 3d. *Pacific Business News* article (August 28, 2009)

Appendix 3e. Promotional link on
http://www.hawaiienergypolicy.hawaii.edu

Appendix 3f. Promotional flyer

Efforts to Promote the Web Survey since June 2009

Efforts to encourage Hawaiʻi's residents to participate in the online Web-based survey were made through a number of venues:

- Notice in Hawaiian Electric Company's "ConsumerLine" newsletter, which was sent to its customers with the monthly bill in June 2009, which was sent to 250,000 Oʻahu customers.

- Notice was sent to 33,000 Kauaʻi Island Utility Cooperative ratepayers through the monthly bill in June 2009.

- Article in the Honolulu Advertiser: "Hawaiʻi Stands at Energy Crossroads" by Peter Flachsbart and Makena Coffman (July 3, 2009).

- Article in Pacific Business News: "Group Seeks Residents' Views on Energy-Efficient Transportation" by Nanea Kalani (August 28, 2009).

- Notice sent to over 100 HEPF members and friends and posted on the HEPF website.

- Notice sent to the Energy Efficient Transportation Strategies Working Group

- Email notice to 300 members of the American Planning Association, Hawaiʻi Chapter

- Flyer distributed to 50 attendees of "Achieving Win-Win Transportation Solutions Workshop," Tokai University Pacific Center, August 12, 2009.

- Flyer distributed to about 200 attendees of the Hawaiʻi Powered Clean Energy Festival, Aloha Tower Marketplace, July 18, 2009

- Flyer distributed to attendees of the Sakamaki Extraordinary Lecture Series put on by Outreach College, University of Hawaiʻi at Mānoa.

- Flyer distributed to 60 students of the Department of Urban and Regional Planning, University of Hawaiʻi at Mānoa

- Flyer distributed to 15 various departments and offices in the College of Social Sciences, and the College of Tropical Agriculture and Human Resources, University of Hawaiʻi at Mānoa

CONSUMER lines

HECO • VOLUME XXVIII • NO. 7 CONSUMER LINES JULY 2009

Solar program achieves 50,000 milestone!

Hawaiian Electric Company, Maui Electric Company, and Hawaii Electric Light Company have achieved a milestone—50,000 solar water heating installations since the nationally recognized solar water heating rebate program began in 1996.

This significant milestone for the solar industry and the state is shared among solar contractors, developers, the military, and the utilities' customers.

Under the utilities' programs, customers who installed solar water heating systems have:

- Helped reduce the demand for electricity by more than 111,328,000 kilowatt-hours annually
- Avoided the use of 210,000 barrels of oil annually
- Reduced carbon dioxide emissions by 116,000 tons annually

The 50,000 systems installed under the utilities' programs, combined with previously installed systems, bring the total statewide to more than 80,000, making Hawaii a national leader with an estimated one out of three single-family homes equipped with solar water heating.

Honolulu resident Jim Case was the utilities' 50,000th customer after he installed solar on his 63-year-old home on Round Top Drive. Case had looked at solar a decade ago but thought the cloud cover and rainy conditions where he lived would not make solar a cost-effective solution.

All that changed when his daughter Suzanne, executive director of The Nature Conservancy in Hawaii, installed solar water heating and photovoltaic panels on her home next door. "She had successful results, and that's what convinced me," said Case.

Honolulu resident Jim Case, wife Suzanne, and daughter Suzanne, enjoy the benefits of solar water heating despite the overcast conditions at their Round Top Drive home.

Under the utilities' guidance, the programs have grown to nearly 80 participating solar contractors and have established quality standards for solar installations in Hawaii. After 13 successful years, the utilities' solar water heating rebate programs transitioned on July 1 to a Public Benefits Fee Administrator designated by the Hawaii Public Utilities Commission.

Energy efficiency programs transition to new administrator

After awarding more than $97 million in energy efficiency rebates and incentives over the course of 13 years, the Hawaiian Electric companies transferred administration of all their energy efficiency programs to Science Applications International Corporation (SAIC), effective July 1.

The transfer is the result of the Hawaii Public Utilities Commission decision to use a third-party administrator to run the energy efficiency programs previously offered by Hawaiian Electric Company, Maui Electric Company, and Hawaii Electric Light Company.

We want to thank our customers and participating contractors for making the programs so successful. Some of the program's highlights include:

- More than 1.8 million compact fluorescent lights sold
- More than 50,000 solar water heaters installed
- More than 39,000 ENERGY STAR®-qualified appliances sold
- Reduced electricity demand by 169 megawatts
- Avoided the burning of approximately 1.6 million barrels of oil a year
- Reduced emissions of carbon dioxide by 864,000 tons a year

Continued on back page

Produced for customers of: Hawaiian Electric Company • Maui Electric Company • Hawaii Electric Light Company
Consumer Lines • P.O. Box 2750 • Honolulu, HI 96840 • Phone: 543-5670 • http://www.heco.com

Continued from front page

We are working closely with SAIC to make the transition as smooth as possible. As of July 1, SAIC is receiving and processing both SAIC and Hawaiian Electric Company rebate application forms. All forms can be submitted to:

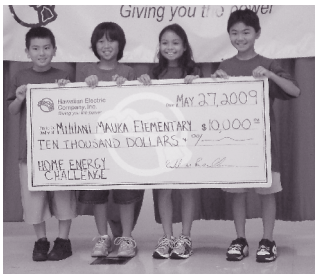
SAIC Residential Rebate
P.O. Box 3920
Honolulu, Hawaii 96812

SAIC Business Rebates
P.O. Box 2040
Honolulu, Hawaii 96805

To learn more, contact SAIC at **537-5577** or e-mail HawaiiEnergy@saic.com.

We continue to run our residential and commercial EnergyScout programs, which can be reached by calling **94-POWER** (947-6937).

Students excel at reducing energy use



Mililani Mauka Elementary students (l to r) Conner Mark, Bryson Yoshimi, Amber Mirafuentes, and Caden Morishige are happy their school won the Hawaiian Electric Home Energy Challenge grand prize.

Congratulations to the students and teachers who won the **Hawaiian Electric Home Energy Challenge**: Mililani Mauka Elementary $10,000 grand prize winner; Hahaione Elementary $8,000 second place winner; and Mililani Ike Elementary $5,000 third place winner.

1,386 families from 11 schools participated in the school-based, energy conservation program this year, saving a total of over 400,000 kWh and $100,000 over the six-month challenge period.

For more information about the Home Energy Challenge, log on to **www.heco.com**.

Students prove the power of the sun!

Al Jerome Leano from Waipahu Intermediate removes the cover shading his light-weight solar-powered car to start the *Solar Sprint*.

"One, two, three, go!" was the signal to remove the covers shading model, solar-powered cars built by elementary and middle school students participating in the *Solar Sprint Exhibition*, held during May.

Over 200 students demonstrated that sunlight hitting a small photovoltaic panel can produce enough energy to power a small electric motor and propel a toy car fast enough to move it down a 60-foot track within 20 seconds.

Participating in this year's *Solar Sprint* were students from Kahuku Elementary, Kahuku High and Intermediate, Laie Elementary, Niu Valley Elementary, Noelani Elementary, Waialua High and Intermediate, Waipahu Intermediate, and Wheeler Middle schools.

The *Solar Sprint*, offered by the Hawaii State Department of Education and sponsored by Hawaiian Electric Company, helps teach children about renewable energy.

Participate in a clean-energy transportation survey!

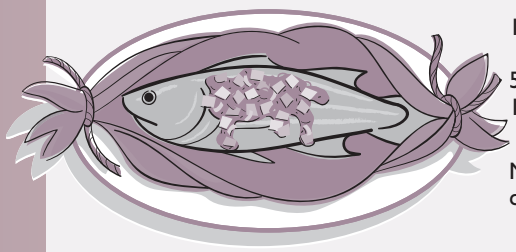
Reducing Hawaii's use of imported fossil fuel includes finding cleaner transportation options. The Hawaii Energy Policy Forum at the University of Hawaii at Manoa is surveying consumer attitudes and behaviors on energy-efficient transportation, and you are invited to participate.

Please spend 15 minutes to take the survey online at **http://survey.claritykit.com**. Your input will help develop clean-energy transportation initiatives. Responses are strictly confidential. Only general findings, not individual responses, will be made public.

If you have questions, please e-mail hawaiienergypolicyforum@gmail.com.

RECIPE OF THE MONTH

Fresh Fruit Salsa



1 mango or papaya, or 1/4 pineapple, or 2 peaches, or 2 plums, diced
5 fresh basil leaves, chopped
1/2 bunch Chinese parsley, chopped
2 stalks green onion, chopped
1 Serrano chile, chopped (or 1/4 to 1/2 teaspoon shichimi togarashi, a Japanese seven-spice pepper mix)
1/4 cup apple cider vinegar
1 heaping tablespoon sugar
Fresh ground pepper

Mix all ingredients together in a small bowl. Serve with chips, cream cheese, grilled fish, chicken, or pork. Recipe makes about 1 cup.

Posted on: Friday, July 3, 2009

Hawaii stands at energy crossroads

By Peter Flachsbart and Makena Coffman

Fluctuating gas prices have made drivers think twice about Hawai'i's reliance on oil imports.

ADVERTISER LIBRARY PHOTO | 2009

A year ago, with gas prices over $4 a gallon, Americans stopped buying monster SUVs or trucks and created a waiting list for fuel-efficient hybrids like the Toyota Prius. Last March, hybrid sales fell sharply as gas prices slipped below $2 a gallon nationwide.

We all know that gas prices are fluctuating, with rapid increases in the past few months. Regular gas now sells for more than $3 a gallon. The current price of oil (roughly $70 a barrel) is twice what it was in February, but half what it was in July 2008.

Some believe that consumers will remain "green" only if energy prices stay high; they propose a flexible "green" tax to fix prices at a higher level. In theory, a predictable higher price for gasoline would send a stronger signal to consumers to buy more fuel-efficient vehicles. Hawai'i is especially sensitive to oil prices as we are the most oil-dependent state.

About 90 percent of our energy needs are satisfied by petroleum. Aviation, electricity and ground transportation each consumes roughly equal portions of crude and refined petroleum. However, their shares are shifting, with petroleum used for airplanes and electric utilities falling and that used by motor vehicles growing. Motor vehicle numbers have risen over the past 10 years due to population and economic growth. In 2007, 1.1 million vehicles — nearly 1.3 vehicles for every eligible driver — were registered in Hawai'i.

In 2007, the state Legislature approved Act 254, tasking the Hawaii Energy Policy Forum with developing energy-efficient transportation strategies. HEPF is a partnership of businesses, environmentalists, energy experts and state government agencies. Its aim is to encourage greater dialogue on energy issues in Hawai'i and offer a vision of an energy-efficient transportation system with flexible options, including mass transit, private and public vehicles.

The good news is that companies such as Better Place, Phoenix Motorcars and Coulomb Technologies propose to introduce electric vehicles and establish infrastructure to test EV technology in Hawai'i. The governor recently signed into law SB 1202, which will require 1 percent of parking spaces in most public lots to be reserved for electric vehicles by the end of 2011. These actions will further the Hawai'i Clean Energy Initiative to decrease energy demand and

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accelerate renewable energy use.

But we have a way to go to reduce our use of fossil fuels for transportation — and, it is hoped, reduce traffic congestion and travel time. What can we do as a community to further our vision of a clean and energy-efficient transportation system for Hawai'i? We need citizens to weigh in on this question and we need to take bold actions on many fronts. But which actions? The Federal Highway Administration and Hawai'i Department of Transportation have provided funds for a telephone and online survey of consumer preferences. Each survey is asking the same questions, including:

- As gasoline prices rise, which transportation options are preferred: (a) buying smaller and more fuel-efficient vehicles; (b) telecommuting; (c) more public transit, motorbikes, car- and vanpools, bicycles and walking, and/or (d) adjusting lifestyle and daily travel behavior?

- What public policies or programs will motivate motorists to purchase and use more fuel-efficient vehicles for personal travel, and more fuel-efficient modes of travel such as buses, car- and van-pools, and bicycles?

- What are attitudes toward planned high-density and mixed-use developments around transit stations proposed for the city rail project?

Results of the telephone and online survey will be analyzed to create policy options for our transportation future — major changes will require consumers and policymakers working together. Local research firm Market Trends Pacific will conduct 15- to 20-minute telephone surveys during July-August. Individual responses will be confidential. You can respond online at: survey.claritykit.com.

Don't miss this opportunity to have your say in planning Hawai'i's transportation future.

Peter Flachsbart and Makena Coffman teach in the University of Hawai'i-Manoa Department of Urban and Regional Planning. They wrote this article on behalf of the Hawaii Energy Policy Forum for The Advertiser.

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Pacific Business News (Honolulu) - August 31, 2009
/pacific/stories/2009/08/31/focus2.html

PACIFIC BUSINESS NEWS

Friday, August 28, 2009

Group seeks residents' views on energy-efficient transportation

Pacific Business News (Honolulu) - by Nanea Kalani Pacific Business News

Wanting to put some walk to its talk, a group focused on energy policies is surveying Hawaii residents to help shape strategies for energy-efficient transportation.

The Hawaii Energy Policy Forum, launched in 2002, sees the statewide survey as a starting point to fulfilling both its mission and a 2-year-old law by looking at residents' attitudes toward transportation and energy use.

The group, which is attached to the **University of Hawaii** at Manoa's College of Social Sciences, has 48 members including representatives from business, government and the community. It states an ultimate goal of achieving Hawaii's "preferred energy future."

The group approached the Legislature in 2007 because it felt no energy-efficiency strategy was in place for the transportation sector, which consumes almost half of the fossil fuels used in Hawaii.

House Bill 869 (now Act 254) was passed that year and gave $50,000 to UH to conduct its survey. The final results will be given to the Legislature before its January 2010 session.

"Despite innumerable plans and studies of energy options over the last three decades, Hawaii's dependence on imported fossil fuels has actually increased," the group says on its Web site. "The purpose of the forum is to develop an energy vision for the year 2030 and to formulate a strategy to ensure its implementation. The intent is to incorporate as many different perspectives and the broadest possible experience into the design of a flexible, forward-looking energy strategy."

In line with that 2030 goal, Gov. Linda Lingle last year formed the Hawaii Clean Energy Initiative with the goal of reducing Hawaii's dependence on oil by requiring that 70 percent of its energy come from renewable sources by 2030.

The Hawaii Energy Policy Forum completed phone surveys with more than 1,500 residents with a mixture of multiple choice, yes/no, and short answers. It also is taking online survey responses on its Web site until Sept. 13.

Market Trends Pacific was hired to make the calls.

Some of the survey questions ask about transportation habits such as driving to and from work or school, mileage efficiency of personal vehicles, how drivers were affected by last year's high gas prices, and what it would take for drivers to use the public bus system more often.

Other questions ask about buying or leasing a vehicle that is able to run primarily on biodiesel or ethanol fuels, and use of the proposed rail system on Oahu.

UH Assistant Professor Makena Coffman, a principal investigator for the research project, declined to share preliminary results so as not to influence those who may still complete the online survey.

"It's clear that to reduce Hawaii's dependence on imported oil we must deal with transportation as well as electricity," said Peter Rosegg, a member of the forum and a spokesman for **Hawaiian Electric Co.** "Instinct tells us we need many methods, including mass transit, efficient vehicles, alternate-fuel vehicles like electric cars, telecommuting and more personal mobility, such as walking and bicycling. The key to understanding how these modes will work is to ask people what they do now, why, what barriers they face to change, and what it will take to overcome those barriers. This survey is a first step."

On the Web

www.hawaiienergypolicy.hawaii.edu

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HEP Project

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Hawaii Energy Policy Forum Today's the last day to take our energy efficiency in transportation study @ http://survey.claritykit.com. Have your say!

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Source: survey.clarity

Tue at 1:22pm

Hawaii Energy Policy Forum For teachers and anyone in need of youth outreach ideas – the American Planning Association's Resourcezine has lesson plans and web resources for every topic, including energy &

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Envisioning a preferred energy future for Hawai'i

The University of Hawai'i at Manoa **Hawai'i Energy Policy Forum** is a unique experiment in collaborative energy planning and policy making. It includes representatives from business, government, and the community. The intent is to incorporate many different perspectives and the broadest possible experience into the design of a flexible, forward-looking energy strategy. more

Have your say in achieving energy-efficient transportation in Hawai'i

Take Our Survey!

Reducing Hawaii's use of imported fossil fuel includes finding cleaner transportation options. HEPF is surveying consumer attitudes and behaviors on energy-efficient tranpsortation to develop clean-energy strategies for Hawai'i. Your input is important!

Please participate in this 15 minutes online survey before September 15th. Access it online at http://survey.claritykit.com.

Responses are strictly confidential. Only general findings, not individual responses, will be made public. If you have any questions, please email hawaiienergypolicyforum@gmail.com.

Highlights

HEPF Outreach Events, Summer 2009

HEPF Meetings

Event Calendar

- **August 2009**
  - 8/5/09 (Wednesday): **Biofuel Potential in Hawaii Panel** [Sakamaki Extraordinary Lecture] @ the UH Manoa Architecture Auditorium, 7 to 9 pm
  - 8/11/09 (Tuesday): **Act 254 Working Group meeting**
  - 8/18/09 (Tuesday): **General Membership meeting** @ the State Capitol, 10 am to 1 pm
- **October 2009**
  - 10/16/09 (Friday): **General Membership meeting** @ the State Capitol, 10 am to 1 pm
  - TBA: **Hawaii Live Energy Lite**
- **January 2010**
  - 1/11/ to 1/13/10 (Monday - Wednesday): **Hawaiian Business Conference & Economic Expo** @ the Hawaii Convention Center
  - 1/20/10 (Wednesday): Hawaii State Legislature Opening Day
  - TBA: **General Membership meeting & Legislative Briefing** @ the Hawaii State Capitol
- **May 2010**
  - TBA: **General Membership meeting**
  - TBA: Hawaii State Legislature Adjourns

Announcements

- Check out our blog! www.hawaiienergypolicyforum.blogspot.com. On it you'll find the full version of editorials featured in the Star Bulletin.

COLLEGE OF SOCIAL SCIENCES

HAWAII ENERGY POLICY FORUM

UNIVERSITY OF HAWAI'I AT MĀNOA

Have your say in achieving energy-efficient transportation in Hawai'i!

Reducing Hawaii's use of imported fossil fuel includes finding cleaner transportation options. The Hawaii Energy Policy Forum is surveying consumer attitudes and behaviors on energy-efficient transportation to develop clean energy strategies for Hawaii. Your input is important!

Please participate in this **15 minute** online survey before **September 15, 2009**.

Access it online at http://survey.claritykit.com

Responses are strictly confidential. Only general findings, not individual responses, will be made public. If you have any questions, please e-mail hawaiienergypolicyforum@gmail.com.

For more information about HEPF, visit our website: www.hawaiienergypolicy.hawaii.edu or

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Appendix 4

Zip Code Definitions of O‘ahu Geographic Districts

Zip Codes on the Island of O‘ahu

Area	Zip Code
Aiea	96701
Downtown	96813, 96814
Ewa Beach	96706
Haleiwa	96712
Hauula	96717
Hawaii Kai	96821, 96825
Kaaawa	96730
Kahuku	96731
Kailua	96734
Kaneohe	96744
Kapalama	96817
Kapolei	96707
Kunia	96759
Laie	96762
Main Office (Airport)	96818
Makiki	96822, 96826
Mililani	96789
Pearl City	96782
Sand Island	96819
Wahiawa	96786
Waialae Kahala	96816
Waialua	96791
Waianae	96792
Waikiki	96815
Waimanalo	96795
Waipahu	96797

Source: Hawaiian Telcom Whitepages, 2010

Appendix 5

Attitudes Toward Transit Oriented Development:
Results of a Joint Telephone and Web-based Survey in Honolulu
during Summer 2009
By Peter Flachsbart and Makena Coffman

Attitudes Toward Transit Oriented Development:
Results of a Joint Telephone and Web-based Survey in Honolulu during Summer 2009

by

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Honolulu, Hawai'i
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Session 018: Land Use and Transportation Connection
Thursday, March 11, 2010

This paper was prepared in cooperation with the State of Hawai'i, Department of Transportation, Highways Division and the U.S. Department of Transportation Federal Highway Administration.

Acknowledgments

This paper is based on data collected through Task Agreement No. HWY-P 2009-001 between the University of Hawai'i at Manoa and the Hawai'i State Department of Transportation (HDOT). The Federal Highway Administration and a local match provided funding for the project. Mr. David L. Zevenbergen of the Statewide Transportation Planning Office served as project manager for HDOT. The Task Agreement, better known as the Strategies for Energy Efficiency in Transportation or SEET project, spanned the period from March 4, 2009 to May 31, 2010.

Dr. Sharon Miyashiro, Associate Director of the UH Manoa Public Policy Center in the College of Social Sciences, served as Principal Investigator of the SEET project. Dr. Miyashiro also serves as co-chair of the Hawaii Energy Policy Forum (HEPF). In 2007, the state legislature approved Act 254, which assigned HEPF with the task of promoting dialogue on energy issues and developing energy-efficient transportation strategies for the state. HEPF is a partnership of representatives from business, environmental organizations, energy experts and state government agencies.

As a result of a competitive bidding process, the University of Hawai'i at Manoa hired Market Trends Pacific, a professional market research firm in Honolulu to provide assistance with the following activities associated with the Task Agreement. These activities included: (a) the design and implementation of the sampling plan; (b) the formatting and programming of the telephone and Web-based survey questionnaires; and (c), the processing and tabulating of all survey data. UrbanAdvantage, Inc. of Berkeley, California, provided digital copies of the graphic images used in the Web-based survey.

This paper has not yet received peer review. The contents of the paper reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of Hawai'i, Department of Transportation or of the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

The Authors

Peter Flachsbart, Ph.D., AICP, is Associate Professor of Urban and Regional Planning at the University of Hawai'i at Manoa. He teaches graduate level courses in land use and transportation planning, the use of decision-making and forecasting models in planning, and survey research methods in planning. He is currently the senior faculty researcher for the Strategies for Energy-Efficient Transportation project at the university's Public Policy Center. He has held faculty appointments in public administration at California State University, Dominguez Hills, and in civil engineering at Stanford University. He holds a Bachelor of Science in civil engineering from Washington University in St. Louis, and a Master of Science and Ph.D. in urban systems planning from Northwestern University in Evanston, Illinois.

Makena Coffman, Ph.D., is Assistant Professor of Urban and Regional Planning, University of Hawai'i at Manoa. She teaches graduate courses in environmental planning related to climate change mitigation and adaptation in the Asia/Pacific Region; energy policy, particularly for renewable energy penetration; multi-sector collaboration for environmental solutions; and environmental valuation. She is the Vice Chair of the Manoa Climate Change Commission; member of the State Greenhouse Gas Emissions Reduction Task Force and Chair of the Analysis Committee. She is a junior faculty researcher for the Strategies for Energy-Efficient Transportation project at the university's Public Policy Center. She holds a B.A. in international relations from Stanford University and a Ph.D. in economics from the University of Hawai'i at Manoa.

Abstract

The Honolulu high capacity transit project is a 20-mile elevated rail line that will connect West O'ahu with downtown and the Ala Moana Shopping Center. The system will feature electric, steel-wheel trains each capable of carrying more than 300 passengers. The goal of the project is to safely and reliably move thousands of people per hour between 21 stations without reducing limited highway and road space. The project is scheduled to begin construction sometime in 2010. To comply with requirements for federal funding, the city's Department of Planning and Permitting has actively supported the planning of transit-oriented development (TOD) at several stations along the transit route.

This paper presents results of a joint telephone and Web-based survey conducted during summer 2009. Although the survey population was statewide, the scope of this paper is limited to data collected on the Island of O'ahu, because the focus of the paper is on rail transit and TOD. On O'ahu, data were collected from 585 adult residents by Market Trends Pacific, Inc., a professional market research firm in Honolulu. The phone survey used random digit dialing (RDD) of both listed and unlisted household telephone numbers to ensure a representative sample. The study used several methods to publicize the Web-based survey, which was undertaken primarily to reach people without land-line phones. These methods included publication of an article in a daily newspaper and an announcement in a monthly newsletter published by the local electric utility. Despite these efforts, the authors do not view the Web sample to be representative of the island's population.

Each mode of data collection had identical questions to measure attitudes toward several features of TOD such as high-density housing, mixed land use, limited parking, and streetscapes that better serve pedestrians and bicycles. Questions about TOD features were directed only to people who said that they either would or might consider moving closer to work or school to save money, if the price of gasoline were to rise and stay above $4 per gallon. As a result, 115 persons answered TOD questions in the telephone interviews and 53 persons did so in the Web-based survey.

In general, the results of the phone survey indicated solid support for the idea of living within walking distance of food, drug and other retail stores. Much smaller percentages of respondents to the phone survey favored the following features: having a common area for children to play, a more densely populated area, living in a building with professional offices or small retail stores, living close to a bus or potential rail transit stop, and having less space to park a personal vehicle even though one could walk or use a bicycle more often. In general, there was more support for features of TOD among those who participated in the Web-based survey, which posted graphical images to illustrate these features. Compared to the phone sample, substantially higher percentages of Web respondents were Caucasian males, who were younger in age, college graduates, and living in families with higher annual incomes. Respondents of both samples were more likely to live in a single-family dwelling unit.

Introduction

The Honolulu high capacity transit project is a 20-mile elevated rail line that will connect West O'ahu with downtown and the Ala Moana Shopping Center. The system will feature electric, steel-wheel trains each capable of carrying more than 300 passengers. The goal of the rail project is to safely and reliably move thousands of people per hour between 21 stations without reducing limited highway and road space. The project is now scheduled to begin construction sometime in 2010. Full service to Ala Moana Shopping Center may begin by the end of 2018. A final decision on federal funding is not expected until 2011. To comply with requirements for federal funding, the Department of Planning and Permitting of the City and County of Honolulu has actively supported the planning of transit-oriented development (TOD), beginning with two transit stations in the Waipahu Community in July 2007.

This paper presents results of a joint telephone and Web-based survey conducted statewide in Hawai'i during summer 2009. The survey had two main objectives. First, it attempted to determine how motorists coped with a spike in gasoline prices during 2008. Second, it measured preferences for policies to improve energy efficiency in the state's surface transportation system. These policies included: (a) increasing passenger loads of existing vehicle fleets (e.g. car and vanpooling); (2) inducing shifts to more fuel-efficient modes of transportation (e.g., bicycling, walking, and public transit); (3) providing incentives for motorists to buy more fuel-efficient vehicles (e.g., the "cash-for-clunkers" program); and (4) redistributing urban activities to reduce overall travel demand (e.g., 'smart growth' and transit-oriented development policies).

Although the survey was conducted statewide, the scope of this paper is limited to survey data collected only for the City and County of Honolulu on the Island of O'ahu. The primary purpose of the paper is to report preliminary results of those survey questions that were related to Honolulu's rail transit project and to attributes of 'smart growth' and transit-oriented development, given that TOD represents a new and different type of development for Honolulu.

Transit–Oriented Development

In *The Next American Metropolis*, architect Peter Calthorpe (1993) describes TOD as "a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, bicycle, foot, or car." (Calthorpe, 1993, p. 56) According to Calthorpe (1993), urban TODs should be located directly on rail transit lines and neighborhood TODs should be located along local bus lines that feed directly into rail transit lines. He describes urban TODs as denser and more focused on employment opportunities than are neighborhood TODs, which tend to emphasize housing.

According to Calthorpe (1993), the minimum residential density for TODs with a housing component should average 15 dwelling units per acre. This figure is close to the density of streetcar suburbs of the early 20th century (Warner, 1962), and significantly higher than today's typical suburban developments, which are closer to four or five dwelling units per acre (Audirac, 1999). Similarly, Bernick and Cervero (1997) prescribed 15 housing units per acre for TODs with mixtures of small-lot single-family homes and duplexes or triplexes. These density

recommendations come from the pioneering work on public transportation and land use policy by Pushkarev and Zupan (1977). Besides higher than average densities, a TOD typically will have a mixture of land uses (residential, office and retail), a defined center, and buildings whose design and orientation facilitate transit use and pedestrian activity.

While planners may agree on some basic definition of TOD, there is in reality a wide variety of transit-oriented development in the United States. Based on a survey of transit agencies and a literature review in late 2002, Cervero et al. (2004) identified 117 TODs in the United States. Although the majority of them are located in large cities with rail service, many are located in newer and older suburbs outside of central cities. Fixed rail transit systems serve most of the 117 TODs that were identified in the U.S., as shown below:

Heavy rail	37.4%
Light rail	31.3%
Commuter rail	21.8%
Bus	7.8%
Ferry	1.7%
	100.0%

TODs are expected to reduce the use of single-occupant motor vehicles and enhance transit investments by bringing potential riders closer to transit facilities. Newman and Kenworthy (1999) believe that TODs have great potential for reducing automobile use, increasing transit ridership, and fostering a sense of community in neighborhoods. In theory, TODs should be able to reduce personal transportation costs, motor vehicle emissions, and dependency on fossil fuels. They should also be able to promote access to local services and amenities through walking and biking activities. In suburban areas, TODs have the potential to increase transit ridership, reduce commute distances, and decrease the cost of infrastructure extensions.

The literature suggests that TOD can be viewed either as a set of policies affecting urban form near transit stations or as a type of development, as suggested by an Urban Land Institute (ULI) report titled, "Ten Principles for Successful Development Around Transit" (Dunphy et al., 2003). Although the number of TODs is growing, there are few development companies that specialize in TOD construction as a market niche. This has been attributed to transit's inability to attract a sufficient volume of patrons to support TOD, according to a comprehensive report by the California Department of Transportation (Parker et al., 2002). However, the same report claims that there are a variety of factors still driving demand for TOD in the real estate market:

1. Escalating traffic congestion is increasing the attractiveness of inner city sites and suburban locations that are close to rail transit.
2. Rising land values in many communities are creating the economic conditions necessary to help make mixed-use compact development feasible.
3. The increased trend of Americans moving back into the core areas of cities makes them more attractive places for real estate investment.

4. Demographic changes underpin an expanding market for moderate and higher-density mixed-use communities.
5. Nationwide, support for 'smart growth' is at record levels. In a September 2000 poll, nearly 80% of Americans indicated that they support 'smart growth' and the strategies necessary to implement it.
6. There have been recent significant changes in Federal Transit Administration (FTA) policies for 'joint development', and an emphasis on transit-supportive land use in federal funding for new rail starts.
7. More transit agencies are starting to realize they are in the 'community-building' business as well as the 'people-moving' business.

In the early 1990s, surveys of 28 large-scale housing projects near California rail stations showed that residents tended to be young professionals, singles, and 'empty-nesters', with typically just one car per household. They also tended to work in downtown areas and other locations well serviced by transit (Cervero, 1994). More recent surveys show that this demographic group is growing larger. People who prefer to live in housing near transit, which includes people living in downtown locations, are more likely to be singles, childless married couples or smaller families. Increasingly, they may also include same-sex couples and the "creative" class who are interested in accessing urban amenities (Florida, 2003). Developers of TOD now target this demographic group in their advertising campaigns, which claim that TODs provide home buyers with good access to centrally located jobs, retail stores, walkable neighborhoods, museums, concert halls, theaters, and nightlife.

More recently, Lund (2006) surveyed 605 people who moved into a TOD within walking distance of a light, heavy, or commuter rail station in the San Francisco Bay Area, Los Angeles, or San Diego. Each person had moved into a TOD less than five years before the survey. The purpose of the study was to determine: (1) who is locating in TODs and how do they differ from the general population; (2) what factors lead them to locate in TODs; and (3) what are the implications for transit use? Lund found that TOD residents had a higher household income and were less likely to be Hispanic. She found they were no less likely to have private cars, which suggested that limiting parking availability at TODs might not be a good idea. She also reported that individuals chose to live in TODs for a wide range of reasons. About a third of the respondents said that access to transit was one of the top three reasons for choosing to live in a TOD. However, people were equally or more likely to choose to live in a TOD because of lower housing cost or the quality of the neighborhood. Lund did not determine whether or not respondents brought their interest in transit with them, when they moved into TODs, or developed their interest in transit afterwards. Even so, Lund found that people who chose TOD were 13 to 40 times more likely to use transit than those who did not.

Based on surveys, Cervero (1994) reported that residents living within a quarter mile of a California rail station are three times as likely to commute by rail compared to the average worker living in the same city. The two most important factors determining rail transit usage were whether the trip destination was within walking distance of a rail stop and whether parking at the job site was free. Among those living near BART stations and heading to San Francisco job sites with no free parking, nearly nine out of ten work trips were by BART. For trips to secondary urban centers such as Oakland and Berkeley, half of the commutes were by BART.

For all other destinations (where workers often park free), only 6 percent of commute trips by station-area residents were by rail (Cervero, 1994).

Survey Methodology

Telephone interviews were conducted by Market Trends Pacific, a professional market research firm in Honolulu, between June 23 and August 5, 2009. Interviewers made telephone calls during daytime and evening hours. They also made up to 10 follow-up calls to working residential numbers to maximize response to the phone survey. The Web-based survey was posted online from July 1 through September 15, 2009.

To be eligible for either the telephone or Web-based survey, participants had to be adults (i.e., 18 years of age or older) and residents of the State of Hawai'i at least six months out of a year. In addition, participants must have made at least one trip from home to a destination on their island during the week prior to the interview. For the purpose of this study a "trip" was defined as traveling by any mode of transportation, including walking. Of all those people who were contacted, only eight percent refused to complete the phone survey and only five percent were considered ineligible for that survey.

The telephone survey was based on a sampling plan as shown in Table 1. The plan was designed to provide a sample for each of the four main counties of the State of Hawai'i to ensure that projections for each county fell within ±5.0 percentage points at the 95 percent confidence level. A total of 1536 people statewide completed the telephone survey questionnaire and an additional 304 people participated in the Web-based survey. On the Island of O'ahu, a total of 401 people completed the telephone survey and an additional 184 people participated in the Web-based survey. The phone survey used random digit dialing (RDD) of both listed and unlisted household telephone numbers to increase the chances of achieving a representative sample. The study used several methods to publicize the Web-based survey, which was undertaken primarily to reach people without land-line phones. These methods included publication of an article in one of the city's daily newspapers (*The Honolulu Advertiser*) and an announcement in a monthly newsletter published by the local electric utility (Hawaiian

Table 1. The 2009 SEET Telephone Survey Sampling Plan

County	*Estimated Population 18+ years*	*Percent of State Total*	*Final Sample Size*	Precision at 95% Confidence Level
Honolulu	704,243	71.0	401	± 4.9
Hawai'i	130,886	13.2	382	± 5.0
Maui (1)	108,740	11.0	380	± 5.0
Kauai	48,054	4.8	373	± 5.1
State Total	991,923	100.0	1,536	±3.2

(1) Include Kalawao County
Source: Estimates of population ages 18+ came from Profile of General Demographic Characteristics 2005-2007 American Community Survey 3-Year Estimates.

Electric Company, Inc.). The Web-based sample is not viewed as representative of the island's population, because survey participants were self-selected.

At the end of the telephone survey, the data were compared to population statistics based on the 2005-2007 three-year estimates provided by the American Community Survey of the U.S. Census for Hawai'i. This comparison led to a decision to weight the results of the telephone survey so that they conformed to population distributions for three variables: respondent's county of residence, age, and gender. Population estimates for each county-age-gender combination were divided by actual sample counts to obtain sample weights. Weights could not be calculated for cases for which the respondent refused to divulge their age. Such cases were not included in weighted tallies of the survey data. The results shown in this section of the paper for telephone interviews represent weighted data.

Unlike the telephone survey, the Web-based survey included seven visual images to illustrate TOD questions. The graphic images were selected from a large inventory of photo-realistic computer images sold online by UrbanAdvantage of Berkeley, California. The reason to include these images was based on a persuasive article by Malizia and Goodman (2000), who reported that consumer preferences for higher density housing tend to be underestimated by conventional opinion surveys. Their report was supported by a more comprehensive review of the literature on this subject at the Center for Urban and Regional Studies of the University of North Carolina (Malizia and Exline, 2000). That review observed that standard opinion surveys routinely report that consumers do not want to live in higher density developments. As a result, such surveys tend to understate consumer interest in higher-density areas. The study also found that when consumer opinions are measured by visual surveys using photographs, these surveys found an increase in the percentage of consumers who preferred smaller lots, smaller homes, mixed housing types, open space, narrower streets with sidewalks, and commercial development within walking distance. Malizia and Exline (2000) concluded that density is a complex concept, which is too subjective to be measured by traditional surveys. They also concluded that well designed higher density developments with a mix of housing types can and will receive higher marks than traditional single-family developments. Their advice was that local officials should not be discouraged from considering higher-density developments, because of misleading results of conventional consumer surveys.

Aside from these visuals, the telephone and Web-based surveys had identical questions to measure attitudes toward Honolulu's rail transit project and several features of TOD. These features included high-density housing, mixed land use, limited parking, and streetscapes that better serve pedestrians and bicycles. Questions about TOD features were only asked of people who said that they either would or might consider moving closer to work or school to save money, if the price of gasoline rose and stayed above $4 per gallon. Since many people said "no" to this question, it reduced the sample size for subsequent questions on TOD to 115 persons for the telephone survey and 53 persons for the Web-based survey.

The rationale for choosing $4 per gallon as the potential "trigger price" for measuring modifications in commuting behavior in the survey was based on several observations made in 2008. First, Hawai'i AAA reported that the price of gasoline in Honolulu had risen to over $4 per gallon in June 2008, almost a dollar more per gallon than it was three months earlier (Pang,

2008b). Many consumers expected gas prices to continue climbing during the summer of that year. AAA also reported that high fuel costs had caused many of its members to adjust their travel behavior in various ways, based on a survey at the end of April (Arakawa, 2008). Newspaper reports by Pang (2008a) and Vorsiono (2008) indicated that use of public transit had increased on the islands of O'ahu and Kaua'i, and many commuters were beginning to use other modes of travel (e.g., biking, carpools and vanpools). There was also renewed interest in telecommuting in Honolulu (Hill, 2008).

High-fuel prices also motivated many consumers to buy more fuel-efficient cars and gas-electric hybrids and fewer large personal trucks and SUVs, which General Motors perceived to be permanent (Krisher, 2008a). These market adjustments caused U.S. automakers to make fundamental changes in their business models (Durbin and Krisher, 2008; Krisher and Durbin; Krisher, 2008b). Accordingly, the SEET survey asked several questions about fuel-efficient cars, including a question designed to determine what gasoline price would motivate consumers to buy such a car.

Besides the city's efforts to promote transit-oriented development, there were several other reasons for including TOD questions in the survey. First, there were reports at the national level of growing consumer demand to live in communities that adhered to 'new urbanist and smart growth' principles (Steuteville, 2007, 2008). Second, there were reports that homes near transit stops in urban areas were only marginally affected by the latest slump in the housing market (Langdon and Steuteville, 2007). During the run-up in gas prices in 2008, home prices in neighborhoods with short commutes were not falling as much as in neighborhoods with long commutes (Schalch, 2008). Finally, recent planning studies indicated that 'smart growth' policies would be needed to supplement improvements in vehicle and fuel technology. Some academics in the planning profession predicted that both land use planning and technological progress would be needed to offset the effects of "peak oil" and climate change (Andrews, 2008; Ewing et al., 2007).

Results of the Survey

Demographic Characteristics of Survey Participants

The demographic characteristics of people who participated in the telephone or Web-based surveys are quite different as shown in Table 2. Compared to the telephone survey, substantially higher percentages of respondents in the Web-based survey were males, adults of age 18 to 34, white, college graduates, and lived in families with annual incomes over $100,000. The telephone sample had a higher percentage of people who lived in a single-family detached house. The telephone sample was designed to resemble the population of the City and County of Honolulu in terms of gender and age.

Table 2. Demographic Characteristics of the Telephone and Web-based Surveys

	Telephone Survey	Telephone Survey Sample Size		Web-based Survey	Web-based Survey Sample Size
Male	49.9%	1.091		57.7%	52
Adults ages 18 – 34	31.3%	1.091		41.2%	51
White	26.5%	1,060		41.5%	53
College graduate	41.8%	989		79.2%	53
Annual family incomes over $100,000	22.9%	794		45.1%	51
Living in a single-family detached house	70.6%	1,089		60.4%	53

Attitudes toward and Preferences for Rail Transit and TOD

The results of the rail transit and TOD questions of the telephone and Web-based survey are tabulated below. As mentioned previously, the telephone survey results are based on a weighted sample to conform to population distributions for three variables: respondent's county of residence, age, and gender. The Web survey results are not based on a weighted sample. The exact wording of the question is given below in italics.

Telephone Question 30A and Web-based Question 46*: You said earlier that you commuted from home to work or to school last week using a motor vehicle. If the price of gas were to rise and stay above $4 per gallon, would you look for a place to live closer to work or school to save money?*

Table 3. Results for Telephone Question 30A and Web-based Question 46

	Telephone (n = 567)	Web (n = 129)
Yes	13.2%	14.7%
No	78.6%	48.1%
Maybe	7.0%	26.3%
Don't know / refused	1.1%	10.9%

Table 3 shows that 20.2 percent of the telephone sample versus 41.0 percent of the Web-based sample, would or might look for a place to live closer to work or school to save money, if the price of gas were to rise and stay above $4 per gallon.

Next, the respondent was asked a series of eight questions about TOD, if they said either "yes" or "maybe" to telephone Question 30A or Web-based Question 46. In other words, these questions were asked of those who either would or might look for a place to live closer to work or school, if the price of gas were to rise and stay above $4 per gallon. The premise or stem of each TOD question was the same: *Suppose that you found a new place to live with a shorter commute that satisfied you. Let's also suppose that your new place differs from your present home in some respects. Would you still be willing to live in this new place if it…*

Telephone Question 31A and Web-based Question 47: … *has less space than your present home?*

Table 4. Results for Telephone Question 31A and Web-based Question 47

	Telephone (n = 115)	Web (n = 53)
Yes	8.7%	35.9%
No	60.3%	24.5%
Maybe	18.7%	39.6%
Don't know / refused	12.3%	0%

Table 4 shows that 35.9 percent of the Web-based sample versus only 8.7 percent of the telephone sample, would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it has less space than their present home.

If the respondent said "yes" or "maybe" to the question above, then he or she was asked the following question:

Telephone Question 31a_1 and Web-based Question 48: *How much interior living space does your present home have?*

Table 5. Results for Telephone Question 31a_1 and Web-based Question 48

	Telephone (n = 31)	Web (n = 53)
< 1000 square feet	39.4%	9.5%
1000 – 1500 square feet	46.8%	26.4%
> 1500 square feet	4.8%	39.6%
Don't know / refused	9.0%	24.5%

Table 5 shows that 39.6 percent of the Web-based sample, versus only 4.8 percent of the telephone sample, have more than 1,500 square feet of living space. In other words, a much higher percentage of telephone respondents (compared to those in the Web survey) lived in relatively small homes. This result may explain why participants in the telephone survey were less willing than those of the Web survey to move to an even smaller home with a shorter commute to work or school, as shown by results to the previous question.

Telephone Question 31B and Web-based Question 49: … *has a common area for children to play?* The Web-based survey had this additional sentence: *The image below shows an illustration.*

Table 6. Results for Telephone Question 31B and Web-based Question 49

	Telephone (n = 115)	Web (n = 53)
Yes	24.4%	71.7%
No	51.6%	11.3%
Maybe	20.2%	17.0%
Don't know / refused	3.8%	0%

Table 6 shows that 71.7 percent of the Web-based sample, versus 24.4 percent of the telephone sample, would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if the new place has a common area for children to play. Neither survey determined whether a children's play area was viewed as a positive or negative feature of the neighborhood.

Telephone Question 31C and Web-based Question 50: … *is located in a more densely populated area?* The Web-based survey had this additional sentence: *The image below shows an illustration.*

Table 7. Results for Telephone Question 31C and Web-based Question 50

	Telephone (n = 115)	Web (n = 53)
Yes	29.8%	64.2%
No	55.2%	11.3%
Maybe	15.0%	24.5%
Don't know / refused	0%	0%

Table 7 shows that 64.2 percent of the Web-based sample, versus 29.8 percent of the telephone sample, would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it is located in a more densely populated area.

Telephone Question 31D and Web-based Question 51: *… is located in an apartment within walking distance of food, drug and other retail stores?* The Web-based survey had this additional sentence: *The image below shows an illustration.*

Table 8. Results for Telephone Question 31D and Web-based Question 51

	Telephone (n = 115)	Web (n = 53)
Yes	66.3%	71.7%
No	27.9%	11.3%
Maybe	5.8%	17.0%
Don't know / refused	0%	0%

Table 8 shows that a slightly higher percentage of the Web-based sample (71.7 percent), compared to that of the telephone sample (66.3 percent), would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it is located in an apartment within walking distance of food, drug and other retail stores.

Telephone Question 31E and Web-based Question 52: … *is located in a building that has professional offices or small retail stores?* The Web-based survey had this additional sentence: *The image below shows an illustration.*

Table 9. Results for Telephone Question 31E and Web-based Question 52

	Telephone (n = 115)	Web (n = 53)
Yes	34.8%	64.2%
No	54.8%	13.2%
Maybe	10.4%	20.8%
Don't know / refused	0%	1.8%

Table 9 shows that 64.2 percent of the Web-based sample, versus 34.8 percent of the telephone sample, would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it is located in a building that has professional offices or small retail stores. Neither survey determined whether this living arrangement was viewed as a positive or negative feature.

The results for Telephone Question 31F and Web-based Question 53 are not reported in this paper, because these questions were not asked of O'ahu residents; these questions were asked of 'neighbor island' residents."

Telephone Question 31G and Web-based Question 54: *… is close to a bus or potential rail transit stop?* The Web-based survey had this additional sentence: *The image below shows an illustration.*

Table 10. Results for Telephone Question 31G and Web-based Question 54

	Telephone (n = 115)	Web (n = 53)
Yes	26.3%	47.2%
No	41.9%	5.6%
Maybe	19.5%	32.1%
Don't know / refused	12.3%	0%

Table 10 shows that 47.2 percent of the Web-based sample, versus 26.3 percent of the telephone sample, would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it is close to a bus or potential rail transit stop. It should be noted that this is the first question in the series of eight questions about TOD features to mention the phrase "rail transit stop." None of the previous questions in this series actually mention the phrase "rail transit stop".

Telephone Question 31H and Web-based Question 55: … *has less space to park your vehicle, but you could walk or ride your bicycle more often?* The Web-based survey had this additional sentence: *The image below shows an illustration.*

Table 11. Results for Telephone Question 31H and Web-based Question 55

	Telephone (n = 115)	Web (n = 53)
Yes	38.3%	56.6%
No	49.6%	17.0%
Maybe	12.1%	26.4%
Don't know / refused	0%	0%

Table 11 shows that 56.6 percent of the Web-based sample, versus 38.3 percent of the telephone sample, would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it has less space to park a vehicle, but one could walk or ride a bicycle more often.

Results for Telephone Questions 32 through 34 and Web-based questions 58 through 60 are not presented in this paper, because they were not about rail transit or TOD.

Telephone Question 35 and Web-based Question 61: *The City and County of Honolulu is planning to build a rail transit system from Kapolei to the Ala Moana Shopping Center. The city expects to complete construction of this system in 2018. Will this transit system provide service to your community or the general area where you live?*

Table 12. Results for Telephone Question 35 and Web-based Question 61

	Telephone (n = 1091)	Web (n = 53)
Yes	26.5%	37.8%
No	57.0%	52.8%
Maybe	14.9%	9.4%
Don't know / refused	1.6%	0%

Table 12 shows that 37.8 percent of Web respondents, versus 26.5 percent of telephone respondents, believe that the city's rail transit system will provide service to their community or the general area where they live.

The next question was asked if the respondent answered "yes" or "not sure" to the question above.

Telephone Question 36 and Web-based Question 62: *Suppose the rail transit system was in operation now and that the price of gasoline was and stayed above $4 per gallon. Do you think you would use the rail system for <u>some</u> of the trips you make?*

Table 13. Results for Telephone Question 36 and Web-based Question 62

	Telephone (n = 1091)	Web (n = 53)
Yes	66.2%	72.0%
No	14.2%	4.0%
Maybe	19.6%	24.0%
Don't know / refused	0%	0%

Table 13 shows that a large majority of respondents in both the telephone and Web surveys would use Honolulu's planned rail transit system for some of the trips they make, if the price of gasoline was and stayed above $4 per gallon.

Telephone Question 37 and Web-based Question 63: *Does the idea of living in a neighborhood within convenient walking distance of a rail transit stop appeal to you?*

Table 14. Results for Telephone Question 37 and Web-based Question 63

	Telephone (n = 1091)	Web (n = 53)
Yes	49.4%	73.6%
No	34.0%	11.3%
Maybe	13.1%	13.2%
Don't know / refused	3.5%	1.9%

Table 14 shows that living in a neighborhood within convenient walking distance of a rail transit stop appealed to 73.6 percent of Web respondents, versus 49.4 percent of telephone respondents. By comparison, Table 10 showed that only 47.2 percent of respondents in the Web survey would be willing to live in a new place with a shorter commute to work or school, and would still be willing to live there if it is close to a bus or potential rail transit stop. Ostensibly, the results of Tables 10 and 14 appear to be inconsistent. On the one hand, a large majority of Web respondents liked the idea of living in a neighborhood within convenient walking distance of a rail transit stop; but slightly less than a majority of them liked the illustration of that concept.

Summary of Results

The 2009 SEET study showed that if the price of gas were to rise and stay above $4 per gallon, then a substantial percentage of adults living on the Island of O'ahu (20.2 percent of the telephone sample versus 41.0 percent of the Web-based sample) would or might look for a place to live closer to work or school to save money. These people were then asked a series of hypothetical questions related to features of transit-oriented development:

> *Suppose that you found a new place to live with a shorter commute that satisfied you. Let's also suppose that your new place differs from your present home in some respects. Would you still be willing to live in this new place if it…*

Table 15. Percentage of Respondents Who Said "Yes": They would be willing to live in this new place if it had these features.

Feature	Telephone Sample (n = 115)	Web-based Sample (n = 53)
… has less space than your present home	8.7 %	35.9 %
… has a common area for children to play	24.4 %	71.7 %
… is located in a more densely populated area	29.8 %	64.2 %
… is located in an apartment within walking distance of food, drug and other retail stores	66.3 %	71.7 %
… is located in a building that has professional offices or small retail stores	34.8 %	64.2 %
… is close to a bus or potential rail transit stop	26.3 %	47.2 %
… has less space to park your vehicle, but you could walk or use your bicycle more often	38.3 %	56.6 %

Many of the features mentioned in Table 15 are attributes of transit-oriented development, especially those TODs that have a residential component. However, the phrase "transit-oriented development" was not mentioned in either the telephone or Web-based questionnaire.

The SEET survey on O'ahu revealed several findings about attitudes toward the Honolulu's rail transit project and preferences for features or attributes of TOD. First, greater percentages of people in the Web-based survey, compared to those in the telephone survey, were willing to live in places that had these features. The only two features not chosen by a clear majority of the Web sample were: (a) less space than your present home, and (b) close to a bus or potential rail transit stop. The latter finding is puzzling, because living close to a bus or rail transit stop is an essential ingredient of transit-oriented development. Thus, a majority of people in the Web survey liked many features of TOD, but most of them disliked having less interior living space and actually living close to a bus or rail transit stop. Nevertheless, a large majority of them found the idea of living in a neighborhood within convenient walking distance of a rail transit stop appealing.

Unlike the telephone survey, which was based on a random sample, participants in the Web-based survey represented a self-selected sample. Compared to the phone survey, substantially higher percentages of respondents in the Web-based survey were males, people of age 18 to 34, white, college graduates, and lived in families with annual incomes over $100,000. A majority of respondents in each sample lived in a single-family detached house, but the percentage of people in such housing units was slightly lower in the Web-based survey. Of these variables, age was significantly correlated with two features of TOD in the telephone survey. All of the young adults (ages 18 to 24) said that they preferred living in locations within walking distance of food, drug and other retail stores and living in a building that has professional offices or small retail stores.

Approximately one in four respondents (26.4%) believed that their community or residential area would be served by the planned rail transit system for Honolulu. Assuming that gas prices were to rise and stay above $4 per gallon, two thirds of residents in likely service areas (66.2%) said that they would use the rail system. Almost half (49.4%) of all O'ahu residents stated that living in a neighborhood within walking distance of a rail transit stop appealed to them.

Conclusion

The initial results of the SEETS survey during the summer of 2009 appear to support the efforts of the City and County of Honolulu to develop new zoning policies to encourage mixed-use, transit-oriented development. Results showed that a substantial percentage of Honolulu residents are likely to accept attributes of transit-oriented developments to achieve a shorter commute from home to work or school. Residents particularly want more convenient access to neighborhood stores and services, family-friendly public spaces, and other modes of mobility besides automobiles. If TOD is well planned and designed, some residents are also likely to accept the idea of living in smaller homes in more densely settled areas. The study thus found that there is definite consumer interest in TOD concepts. The study therefore recommends that local land-use planning and zoning laws encourage and foster this type of development, and

focus some of those efforts on in-fill development within existing urban areas. Those efforts would contribute toward the broader goal of achieving greater energy efficiency in the city's surface transportation system.

This paper could not explain why relatively more Web-based participants showed greater interest in TOD features compared to people who completed the telephone survey. One plausible explanation is the use of graphic images, which were a unique feature of the Web-based questionnaire in this study. A second plausible explanation is that the Web-based sample in this study was self-selected. This study showed that the Web-based sample had demographic characteristics that were different than those of the telephone sample. We recommend that future surveys make use of graphic images to illustrate different attributes of TOD, and analytically test whether these images affect consumer preferences for these attributes. To overcome self-selection bias, we recommend that future studies first derive a random sample of people, by any means possible, and then direct all qualified respondents to visit a Web-site, where they could participate in an online questionnaire that used graphics.

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Appendix 6

Bus Ridership: Understanding Factors & Demand for Transit in Hawai'i
by Gabrielle Sham

The following study was completed by a Masters Candidate in the Department of Urban and Regional Planning, Gabrielle Sham. The study uses a linear econometric model to assess the attributes of bus service that may lead to increased ridership amongst those who have a choice in transportation (i.e. also have access to a vehicle). This study serves as an example of the types of analyses that can be completed with the panel-type survey data collected.

Bus Ridership:
Understanding factors and demand for transit in Oahu, Hawaii

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Spring 2010
PLAN 601: Planning Methods
Dr. Makena Coffman

I. Introduction

Traveling by public transportation saves energy and reduces pollution significantly compared to travel by private vehicles (NAPTA, 2010). According to NAPTA (2010), about 43 percent of America's energy resources are used in transportation—one of the largest energy-used activity. Increasing usage of public transportation can reduce costs and provide better air quality for consumers (NAPTA, 2010). Individuals in Honolulu can save $10,689 annually by riding public transit based on the national average gas price and the national unreserved monthly parking rate (APTA, 2010). Only 6.3 percent of the working population used public transportation as a means to travel to work, while about 64 percent of the working population drove alone to work (US Census, 2000). On Oahu, ridership for TheBus dropped about 2 percent in the last half of 2009 (Oahu Transit Services), while the nation's average ridership dropped nearly 8 percent (APTA, 2010).

Ridership is vital to sustain the transit industry. Without sufficient demand, the transit cannot cost-effectively maintain operations nor achieve its stated environmental benefits. Public transit is popularly demanded in highly dense urbanized area where it is more convenient and economically efficient to use public transit. On the other hand, less dense and more sprawled out areas find driving personal vehicles more efficient in time and cost. It is important for policy makers to understand the characteristics and bus attributes that affect bus ridership in order to implement the appropriate strategy to maintain (or increase) its ridership demand.

Transit riders are comprised of two groups, captive and choice riders (Krizek and El-Geneidy, 2007). Captive riders are commuters who do no have access to a vehicle and must rely on public transit as a mode of transportation. However, choice riders are those

who have access to a vehicle but choose to use public transportation because of personal preference. Based on the study by Krizek et al. (2007), different attributes affect the demand for bus ridership by captive and choice riders. In regards to factors that influence bus ridership, the factors can be divided into two groups—demographic characteristics of the riders and bus attributes. This study uses an ordinary least squares (OLS) model to assess the factors, in particular bus attributes, that influence bus ridership. The study helps to better understand the factors that would make choice riders—those who own a car but choose to use public transportation—use public transportation more often in Oahu. In this research, previous literature on factors contributing to public transit ridership is reviewed. Then, using a unique data set on a sample of Hawaii commuters, the study explores the following:

(1) What factors contribute to bus ridership in Oahu?

(2) What policies can be implemented to maintain the public transit patronage?

This study shows that fare levels and service frequencies explains a significant portion of bus ridership amongst commuters who have access or own a car.

II. Relevant Literature

Factors affecting transit ridership are divided into two categories: external and internal (Taylor and Fink, 2003). External factors are those that can not be control for by transit systems, while internal factors are those that can be controlled by transit systems. Examples of external factors, as mentioned by Taylor and Fink (2003), include employment level, income level, auto ownership, availability and price of parking, and fuel prices.

Internal factors consist of fares prices and service frequency. Both these external and internal factors are drivers for public transit ridership.

Of the external factors, as noted by Taylor and Fink (2003), income level has a negative effect on ridership. High cost and limited availability of parking is positively correlated to ridership (Taylor and Fink, 2003). About 19 to 81 percent fewer employees drive to work alone when they pay for their own parking (Willson and Shoup, 1990). With regards to the effect of gasoline prices on ridership, Lane (2010) found that gasoline prices have a small but significant impact on transit ridership. Of the nine US metropolitan areas examined in the study, only three cities showed an increase in transit patronage with gasoline price fluctuations. Through the study, it appeared that a greater shift from automobile to transit occurred in cities living near an economic level of becoming captive users of transit, or were choosing not to use mass transit despite living in close proximity of available service. In addition, it found that more automobile trips were shifting to the transit mode that provided the greatest level of service within a city. Mattson (2008) finds that bus ridership is fairly inelastic with respect to gasoline price.

Internal factors that transit systems can control which affects ridership include fare levels, service quantity, and service quality (Taylor, Miller, Iseki, Fink, 2009). In a study by Kain and Liu (1999), they found that large ridership increases in Houston and San Diego were caused principally by large service increases and fare reductions.

Aside from fare levels, service level is another internal factor that can be controlled by transit systems. Service level includes both service quantity (measured by coverage and frequency) and service quality. Booz, Allen, Hamilton (2003) reports that service frequency, access to bus stop, in-vehicle time, and likelihood of a transfer all impact

ridership levels. Of the service quality, bus information, on-street service, station safety, cleanliness, route structuring, and strong marketing programs are important factors that affect transit use (Taylor and Fink, 2003).

Taylor et al. (2009) concluded that both fares and service frequency could account for at least a doubling or halving of transit use. In that study, six external and two internal variables explained 91% (R^2=0.9125) of the variation in total urbanized area ridership. Omitting the two internal variables (fares and service frequency), the six variables explained 86% (R^2=0.8574) of the total urbanized area ridership. In a study done by Srinivasan, Flachsbart, Dajani, and Hartley (1981), fare cost was nearly twice as important as excess ride time in the overall preference for the transit group. However, Srinivasam et al. (1981) concludes that a 100% reduction in fares or in excess ride time would be necessary to increase transit ridership, to ultimately, reduce the total base line fuel consumption by only 6-7%. Kain and Liu (1999) suggest that through transit policies, adjusting the internal variables (transit frequency and fare levels) can significantly alter transit ridership. Although external factors such as demographics and regional geography play an important role in demand for public transit, internal factors controlled through transit system characteristics is as significant in an urbanized area.

Krizek and El-Geneidy (2007) differentiated between captive and choice users for public transit. Captive riders are transit-dependent—commuters who have no other mode of transportation. On the other hand, choice riders choose to use public transit for personal purposes but have alternative mode of transportation. The type and sensitivity of the various ridership factors affecting these two types of transit users vary differently. By segmenting the transit riders, it is easier to understand the factors affecting each specific

group. Krizek et al. (2007) also surveyed non-users of public transit to better understand factors that can attract transit ridership. Factors affecting both choice riders and potential riders include: reliability, travel time, and type of service. Litman (2004) concludes that transit-dependent riders, or captive riders as categorized by Krizek and El-Geneidy, are less price sensitive than discretionary or choice riders (those who have alternative mode of transportation).

For the study, Krizek et al. (2007) utilized a market segmentation approach to find out specific attributes of a population group. Through this approach, policies can be implemented addressing specific preferences and attitudes to target different groups in the transit market. In the study, riders were grouped into eight different categories: (users of transit) captive riders with regular commuting habits, captive riders with irregular commuting habits, choice riders with regular commuting habits, choice riders with irregular commuting habits; (non-users) auto captives with regular commuting habits, auto captives with irregular commuting habits, potential riders with regular commuting habits, and potential riders with irregular commuting habits. From the study, Krizek et al. (2007) concluded that several characteristics are similar among riders. With regular choice riders, reliability, income and value of time, customer service, and type of service had the greatest influence on ridership. Whereas, potential riders were concerned with safety and comfort of service, and reliability.

Based on the findings from the literature mentioned above, the variables I believe are relevant to my study include demographics and socio-economic variables (external factors), and bus attributes (internal factors) that can influence bus ridership for choice riders (those that are not transit-dependent).

III. Data and variables

The data used in this study was attained from an energy use in transportation study done by the Public Policy Center of the University of Hawaii in 2009. Through a telephone survey, Hawaii residents completed a series of questions lasting between 15-20 minutes, with the overall average length of the survey at 15 minutes and 40 seconds. The phone survey conducted over 1500 interviews through random digit dials for households in Hawaii from June 23, 2009 to August 5, 2009. Calls were made during daytime and evening hours from 2 p.m. to 9 p.m. The survey questions included demographics, bus ridership, changes in travel habits to deal with increase in gas prices, and willingness to seek other methods of transportation.

Table 1 shows the list of variables attained from the phone survey that are used in my research based on previous similar studies. The factors influencing bus ridership for choice riders, which are divided into external and internal factor (based on Taylor and Fink's study), are listed below.

Table 1. Variable Category.

Factors	Variable
External factors	County Actual Age Race Attend school or work Gender Income level Education level Pay for parking work/school Proximity of bus stop
Internal factors	More frequent stops More reliable service Lower/free fare

Table 2 provides a summary of the statistics relevant to this research. The sample size for this model is 363.

Table 2. Summary Statistics.

Variable Type	Variable	No. of Observations	Mean	Standard deviation
Dependent	Choice Riders 1=Ride bus 0= Do not ride bus	1534	.070	.263
Independent				
	Honolulu County	1536	.261	.439
	Actual Age	1268	56.170	16.465
	Race			
	Caucasian	1291	.370	.482
	Asians	1291	.320	.466
	Mixed/Other	1291	.180	.385
	Hawaiian/Part-Hawaiian	1291	.120	.329
	African	1291	.010	.092
	Attend school or work	1429	.510	.500
	Gender (female=1)	1536	.610	.488
	Income	917	3.523	1.720
	Education	1215	3.840	1.493
	Pay for parking at work/school	714	.097	.296
	Proximity of bus stop	1346	2.230	.818
	More frequent stops	1461	.140	.351
	More reliable service	1461	.040	.189
	Lower/free fare	1461	.040	.194

The dependent variable, Choice Riders, is a dummy variable created by the responses attained from the following two questions in the survey: “Do you own, lease or have access to at least one motor vehicle in your household for personal use?,” and “Did you ride [The Bus/The Kauai Bus/The Maui Bus/Hele On] for any trip that you made last

week?" If respondents answered that they owned, leased or have access to at least one car *and* rode the bus for any trips made last week, they were coded as Choice Riders=1; and if they responded "no" to either of the questions, they were coded as Non-choice riders=0. Seven percent (about 107 people) of the 1,534 respondents answered that they have access to a car and rode the bus for a trip they made last week.

Independent variables were attained from responses based on demographics (income, age, level of education, ethnicity), and bus attributes (proximity to bus stop, more frequent stops, etc.). From the survey, 26.1% (about 399) of the respondents was from Honolulu County. Ninety-six percent (about 1302) of the State were classified as car owners or having access to a car. Sixty-one percent of the surveyed were females; thirty-nine were males. Of the 1291 respondents to ethnicity, the majority was comprised of Caucasians (37%) and Asians (32%). Any respondents who classified themselves as Koreans, Japanese, Chinese, and Filipinos were categorized as "Asians." Eighteen percent of the surveyed considered themselves as Mixed/Other, 12% as Hawaiian or Part-Hawaiian, and only 1% as African-Americans. The average respondent had some college education with the mean age of 56. Of the respondents that drove to work or school, only 9.6% of them paid for parking. The average distance to a bus stop was about 5 to 10 minutes. The average income of the respondents was between the 3rd and 4th income category. The 3rd income group is classified as $35,000, but less than $50,000; while the 4th income group is classified as $50,000 but less than $75,000.

The following question in the survey asked "What would it take for you to ride [The Bus/The Kauai Bus/The Maui Bus/Hele On] more often?" By asking "*more often*" in the question, responses imply that respondents are bus riders and that certain characteristics

of the bus would encourage more frequent ridership. Of the bus attributes, three characteristics were used in the model to determine ridership—more frequent service, more reliable service, and a lower or free fare—as service frequency and fare levels both could account for at least a doubling or halving of transit use (Taylor et al., 2009). These are also external factors, as mentioned previously, that can be controlled by transit providers to increase ridership. From the survey, 14% said "more frequent stops", 4% said "more reliable service", and 4% said "lower/free fare" would make them ride the bus more often.

As Kitamura (2009) concludes that moderate increase in household car ownership does not lead to decreased transit ridership, I did not find it necessary to include the number of cars owned as an explanatory variable in my model.

IV. Methods

A linear probability model is used to estimate ridership in Oahu. Using the determinants and factors that affect ridership from previous studies, an OLS model is used in this study.

A linear regression is used on the data collected for Honolulu County. Maui, Hawaii, and Kauai counties are not included in the study because ridership for the bus transit system in Honolulu County is drastically different in geographic and service level relative to the other counties. Additionally, Honolulu County has a larger transit ridership, and the other counties are more rural compared to Oahu's urbanized city.

The initial equation describing choice riders is given by Equation (1).

$$Choice\ Riders_i = \beta_0 + \beta_1(Income_i) + \beta_2(Gender_i) + \beta_3(Age_i) + \beta_4(African_i) + \beta_5(Caucasian_i) + \beta_6(Mixed/Other_i) + \beta_7(Hawaiian_i) + \beta_8(Work/School_i) + \beta_9(PayParking_i) + \beta_{10}(DistancefromBusStop_i) + \beta_{11}(Education_i) + \beta_{12}(fare_i) + \beta_{13}(frequency_i) + \beta_{14}(reliability_i)$$

where $Choice\ Riders_i$ is the number of commuters who took the bus for any trip in a week given they have access to a vehicle, $Income_i$ is an indicator variable representing individual *i*'s income category, $Gender_i$ is an indicator variable representing individual *i*'s gender (female=1), Age_i is an indicator variable representing individual *i*'s actual age, $African_i$ is a dummy variable indicating whether individual *i* is African, $Caucasian_i$ is a dummy variable indicating whether individual *i* is Caucasian, $Mixed/Other_i$ is a dummy variable indicating whether individual *i* is Mixed/Other ethnicity, $Hawaiian_i$ is a dummy variable indicating whether individual *i* is Hawaiian or Part-Hawaiian, $Work/School_i$ is a dummy variable indicating whether individual *i* works or attends school, $PayParking_i$ is a dummy variable indicating whether individual *i* pays for parking where they work or attend school, $DistancefromBusStop_i$ is an indicator variable representing individual *i*'s time category to walk from home to the nearest bus stop in their neighborhood, $Education_i$ is an indicator variable representing individual *i*'s level of education, $fare_i$ is a dummy variable indicating whether individual *i* would take the bus more often given low or free fares, $frequency_i$ is a dummy variable indicating whether individual *i* would take the bus given more frequent stops, $reliability_i$ is a dummy variable indicating whether individual *i* would take the bus given more reliable service.

According to past studies, education and income are highly correlated. To avoid collinearity biased, I checked the correlation coefficient between the two variables. Although the result is highly significant at the 1% level, the correlation coefficient is only

0.344 which is relatively low and does not have a significant effect on the results of the regression. Thus, both the education and income variables were kept in the regression model.

According to the study by Gomez-Ibanez (1996), there was a decline in transit patronage by 0.7 percent with each percentage increase in real per capita income. Income is categorized by income groups and not categorized into a binary variable per income group because the effects of each income group are not particularly important to my study. The variables of interest for my study are the internal bus attributes such as lower/free fare and more frequent services.

Although studies show that gasoline prices have a small effect on transit ridership (Lane, 2010; Agathe and Billings, 1978), gasoline prices is not included as an explanatory variable. Car owners might be affected by higher gasoline prices; however, an increase in a few cents will not significantly change an individual's behavior pattern in the short-run. Additionally, gasoline prices are a relatively small percentage of overall vehicle costs. McLeod, Malcolm, K. Flannelly, L. Flannelly, and Behnke (1999) found that gasoline prices are an insignificant factor to ridership.

Since Honolulu County is more urbanized, there is a larger demand for public transit. It is also more cost-effective as more people use the public transit system in Honolulu County. Because Honolulu County is demographically and geographically different from the other counties, the regression is restricted to Honolulu County residents only. As Honolulu, relative to the other counties, is more city-like and urbanized, Litman (2004) suggests that large cities have more transit-dependent riders, greater traffic congestion, higher parking costs, and improved transit service. People in areas with low

population densities rely more on private vehicles and less on public transportation (Paulley et al., 2006).

Furthermore, Honolulu County's population of above 18 years old represents 71% (about 700,000) of the State of Hawaii. Population of above 18 years old in Hawaii County totaled 13% (about 130,000); 11% in Maui County (about 108,000); and 4.8% in Kauai County (about 48,000) (HEPF Presentation, 2010). However, based on the data collected, each county accounted for roughly 25% of the surveyed in my model. With this in mind, the surveyed does not proportionally reflect the true population portion for each county in the State of Hawaii. Thus, using data from all the counties may distort the results for the actual demand in a given county. To account for this disproportional percentage of the surveyed with the actual breakdown of the county populations in the State of Hawaii, I restricted my regression to Honolulu County. Since I believe demand for bus ridership is greater in Honolulu County, restricting the sample to Honolulu County will provide a better interpretation of the explanatory variables on bus ridership.

V. Results

The results of the Choice Ridership model are reported in Table 3. However, it is difficult to measure a commuter's innate desire to ride the bus whether for environmental, cultural, or economic reasons. Thus, this study suffers from omitted variable bias because a person's personal preference for riding the bus is an unobservable and immeasurable variable. Since a commuter's personal preferences or desire to take the bus is correlated with bus ridership, this poses as a problem because a commuter who has a strong desire to take the bus for environmental concerns regardless of their demographics or bus

attributes. Therefore, this positive correlation between a person's desire to ride the bus based on personal preference and bus ridership can overestimate the effect of the variables of interest in the model. Also, this study suffers from selection bias because individuals for the study were contacted using random dial digits for landlines only. Contacting only landlines can have a large effect on the overall demographics of individuals surveyed for this study. This may also have an effect on correctly representing the population in terms of consumer's attitudes, behaviors, and preferences on energy-efficiency and transportation use.

Table 3. Regression Results.

	Dependent variable = *Choice Riders for Honolulu County Only*	
Variable	**Coefficient**	***T* statistics**
Income	-.069***	-3.918
Gender	-.042	-.799
Caucasian	.131**	2.038
African	-.025	-.098
Mixed/Other	.115	1.599
Hawaiian	.080	.886
Work/School	-.058	-.742
Pay Parking	.082*	1.202
Distance from bus stop	-.010	-.302
Education	-.007	-.356
Actual Age	.004*	1.9223
More reliable service	.032	.275
More frequent stops	.176*	1.823
Lower/free fare	.412***	2.584
Constant	.180	.940
R-squared	.387	

*Indicates statistical significance at the 10% level, ** at the 5% level, ***at the 1% level

The regression model for Choice Riders for Honolulu County produced an R^2 of 0.387. This implies that 38.7 percent of the variability of the dependent variable is

explained by the fitted multiple regression of the dependent variable on the explanatory variables. As expected, the coefficient for "more frequent stops" and lower/free fare" is positive and highly statistically significant. Choice riders in Honolulu County are 17.6% more likely to ride the bus "more often" by an increase in more frequent stops and 41.2% more likely to ride the bus "more often" with a free or lower fare. In regards to the 41.2% of a commuter riding the bus more often given free or lower fare, this may explain the high number of fake passes found on Oahu. These counterfeit passes are being sold for $20 to $25, more than half of the amount of a monthly adult bus pass (Pang, 2010). However, other attributes affecting bus ridership such as "more reliable service", "distance from bus stop", and "work/school" are not statistically significant, but the coefficients were as expected. More reliable service encourages bus ridership; farther distances from a bus stop creates an inconvenience for riders to take the bus, thus, discouraging bus ridership; and working or attending school decreases the chances of being less vehicle dependent, thus, reducing the chance of bus ridership.

Demographic variable such as "Age" and "Income" are also highly statistically significant at the 10% level with a positive coefficient for "Age" and at the 1% level with a negative coefficient for "Income". Commuters are 0.4% more likely to ride the bus given they have access to a car with an incremental increase of a year in age, while commuters are 6.9% less likely to take the bus given a move up in the income category. At the 5% significant level, commuters in the "Caucasian" category are 13.1% more likely to ride the bus given they have access to a car relative to "Asians."

In regards to education, although it is not statistically significant in the regression, the coefficient for "Honolulu" County is negative. As the median income in Honolulu County

is higher than the rest of the State, higher education most often leads to higher income; thus, a greater financial ability of car ownership which can explain the negative coefficient for education and bus ridership for "Honolulu" County.

Although not statistically significant, the constant for Honolulu residents is 0.18. This implies that excluding all the effects of the independent variables, Honolulu residents are 18% likely to ride the bus given they have access to a car.

VI. Conclusion

This study examines the attributes that increases bus ridership in Oahu for individuals who own, lease, or have access to a vehicle. As defined in previous literature, these individuals are classified as "choice riders". For this research, a regression model restricted to Honolulu County was used from a set of data collected for the State of Hawaii. Results from the model indicate a 38.7% "fit" of bus ridership explained by the independent variables. The model examined Honolulu County residents specifically because Honolulu County is demographically, culturally, and geographically different from the other counties. By using all four counties, results may be distorted because of the social-economic and geographic differences between the counties.

Overall, the results from this study support the conclusion of other research regarding factors affecting bus ridership. From the study, an individual will use public transit more often based on two bus attributes—lower/free fare and more frequent services. Both the coefficient of the attributes is significantly higher than the coefficient of the other explanatory variables. Furthermore, "lower/free fare" in Honolulu County plays a more important role in explaining an individual's likelihood to ride the bus given they have

access to a car—increasing an individual's likelihood to ride the bus by 41.2% based on our sample.

From this study, these two attributes would make an individual ride the bus more often. Thus, strategically setting policies that targets these two bus attributes can help to increase, or at least maintain, transit patronage amongst choice riders. Captive riders, commuters who are limited to using public transit, are specifically not examined in this study because they are restricted to using the bus and must rely on public transit as a mode of transportation regardless of any of the bus attributes. Choice riders are the commuters that policy makers can target to increase ridership as their ridership level can vary (unlike captive riders whose ridership is relatively fixed compared to choice riders).

As public transit is environmentally more beneficial than private vehicles, it is crucial to encourage and increase bus ridership especially amongst individuals who have access to a car. However, public transit is only environmentally and economically cost-effective if the demand for ridership is present. By addressing and improving attributes of the bus that are of concern to choice riders, we can ensure that we have the ridership to sustain the transit industry. From the study, reducing fare levels and having more frequent services encourages commuters to ride the bus more often. If policies are implemented to reduce fare levels and provide more frequent service, we can increase bus ridership levels in Hawaii.

Furthermore, it is important to look at each county separately as each county is geographically and demographically different. By examining each county individually rather as one state, policy can be designed and implemented to address the issues and factors affecting ridership for each county.

Ultimately, by using public transit and reducing the use of private vehicles, traffic congestion, energy consumption, and air pollution is reduced. As stated in the Hawaii Clean Energy Initiative (2010), its goal is to meet 70% of Hawaii's energy needs with clean energy by 2030. By promoting and encouraging bus patronage, Hawaii is a step closer to reducing pollution and energy consumption.

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Appendix 7

Incentives and Rebates for Purchase and Use of Fuel-Efficient Vehicles

Incentives and Rebates for Purchase and Use of Fuel-Efficient Vehicles

This appendix provides an inventory of fuel-efficient vehicle incentives and rebates in the United States and Canada. The inventory is organized by state or province. The reader may need to verify the exact language of current rulings with appropriate state or city officials. The descriptions below were taken verbatim from the following Web site: www.hybridcars.com/local-incentives/region-by-region.html, posted March 8, 2010.

UNITED STATES

Arizona Hybrid Incentive

On Feb. 9, 2007, the Arizona Department of Transportation and Former Governor Janet Napolitano announced that three hybrid models—the Honda Insight, Honda Civic Hybrid, and Toyota Prius—are now permitted to use carpool lanes on freeways in Arizona. The decision clears the way for the estimated 9,000 Toyota Prius, Honda Insight and Honda Civic Hybrid vehicles in Arizona to use the carpool lanes, regardless of the number of passengers. The state plans to issue 10,000 hybrid-vehicle permits on a first-come, first-serve basis. A special license plate can be ordered online at www.servicearizona.com [1] or by calling (602) 255-0072. Reduced license fees are available for electric cars and some plug-in hybrids. A tax credit of up to $75 is available to individuals for the installation of EV charging outlets in a house constructed by a taxpayer. (Reference Arizona Revised Statutes 43-1090 and 43-1176)

California Hybrid HOV, Tax, and Parking Incentives

Rebates of up to $5,000 per light-duty vehicle will be available for individuals and business owners who purchase or lease new eligible zero-emission or plug-in vehicles until the funding runs out. Plug-in hybrids qualify for rebates up to $3,000, and electric motorcycles and neighborhood electric vehicles up to $1,500. Certain zero-emission commercial vehicles are eligible for rebates up to $20,000. Vehicles must be purchased or leased after official launch of the program on March 15, 2010.

Sacramento offers free parking to individuals or small businesses certified by the city's Office of Small Business Development that own or lease EVs with an EV parking pass in designated downtown parking garages and surface lots. Free EV charging is also provided in several parking garages.

Many utilities offer discounted rates for residential vehicle charging during off-peak hours.

Reference [2] provides the latest News on Hybrid HOV use in California and other states.

Hybrid car owners who have purchased their hybrids from San Jose dealers are exempt from local parking fees. For eligibility, please contact Jason Burton (408) 794-1427, jason.burton@ci.sj.ca.us [3].

On February 10, 2009, the Los Angeles City Council voted to end the free metered parking program for alternative fuel vehicles begun in 2002. The City of Los Angeles Department of Transportation (LADOT) will begin citing alternative fuel vehicles parked at expired parking meters starting March 1, 2009. For more details, see this Web site: ladot.lacity.org/tf_Clean_Air_Vehicles.htm [4].

If a vehicle has the decal affixed to an alternative fuel, hybrid or electric vehicle, the Santa Monica Municipal Code (3.16.120) allows the driver to park in any metered parking space in the city without charge for the maximum amount of time allowed by that meter. In other words, if you're at a 2-hour meter, you can park there free for 2 hours—but beyond that, you're subject to ticketing for overstaying your welcome. Clean Air Vehicle decals are issued by the state.

Colorado Hybrid, Plug-in Hybrid and Electric Car Tax Credit & Rebates

Colorado offers some of the nation's most generous tax credits for electric cars and plug-in hybrids. In some cases, as much as 85 percent of the cost premium for EVs and PHEVs are available. Many of them are slowly phased out between 2010 and 2016. The credits are often capped at $6,000. Between 2012 and 2016, the cap on PHEV conversions increases to $7,500.

For details, contact Division of Taxation, Colorado Department of Revenue, (303) 238-7378. www.revenue.state.co.us/main/home.asp [5].

Grants are available to local governments for the installation of EV charging stations. Grants are prioritized based on the local government's commitment to energy efficiency. (Reference Senate Bill 075, 2009 and Colorado Revised Statutes 24-38.5-102 and 24-38.5-103)

The Colorado Department of Revenue offers a tax credit for the purchase of a hybrid electric vehicle (HEV), up to $4,713. For more information, including tax credit amounts for Model Year 2002 and 2003 HEVs, please visit: www.revenue.state.co.us/fyi/html/income09.html [6].

The following vehicles are exempt from emissions testing: Toyota Prius and Honda Insight. For questions about other vehicles, contact the county motor vehicle office [7].

Colorado has passed legislation that would allow the hybrids to use the HOV lanes with single occupants. While a federal waiver has been passed, the Colorado Department of Transportation is analyzing that bill and state for compatibility. The EPA has up to 180 days to give the states guidelines for which vehicles would be allowed into HOV lanes pursuant to the new federal law.

Hybrid vehicles registered in the city of Aspen are eligible for a $100 rebate on license registration. The vehicle is also allowed to park with impunity in the city's residential and carpool zones. Owners must register the vehicle with the Parking Department. The City of Manitou Springs offers free parking to hybrid vehicles in the two city parking lots.

Connecticut Sales Tax Exemption

The purchase of hybrid electric vehicles (HEVs) with a fuel economy rating of at least 40 miles per gallon (mpg) and the original purchase of dedicated natural gas, LPG, hydrogen, or electric vehicles are exempt from state sales tax.

On June 6, 2005, the city of New Haven passed a law permitting hybrid vehicles registered in New Haven free parking at metered spots within the city. The ordinance will take effect within one month and only apply to alternative fuel vehicles registered in New Haven. Owners will have to come to City Hall to receive a decal which will be attached to the vehicle. Motorists will still need to obey posted time limits and must park in legal spots. For more information contact DSlap@Newhavenct.net [8].

Delaware

Retail electricity customers with one or more grid-integrated electric vehicles (EV) will be credited in kilowatt-hours for energy discharged to the grid from the EV's battery at the same rate that the customer pays to charge the battery. A grid-integrated EV is defined as a battery-powered motor vehicle that has the ability for two-way power flow between the vehicle and the electric grid as well as communications hardware and software that allow for external control of battery charging and discharging. (Reference Senate Bill 153, 2009)

District of Columbia Hybrid Incentives

The DMV Reform Amendment Act of 2004 went into effect on April 15, 2005. It exempts owners of hybrids and other alternative fuel vehicles (that get 40 mpg or higher) from excise tax and reduces vehicle registration charges. For more information, contact Elizabeth.Berry@dc.gov [9] or Corey.Buffo@dc.gov [10].

Florida Hybrid and Plug-in Hybrid Incentives

Inherently low-emission vehicles (ILEVs) and hybrid electric vehicles (HEVs) may be driven in high occupancy vehicle (HOV) lanes at any time regardless of vehicle occupancy. ILEVs and HEVs that are certified and labeled in accordance with federal regulations may be driven in HOV lanes at any time, regardless of the number of passengers in the vehicle. The vehicle must have a decal issued by the Florida Division of Motor Vehicles, obtained for a $5 fee, which must be renewed annually.

Electric cars are exempt from most insurance surcharges.

The state is offering $500,000 from the Department of Energy's stimulus fund to pay a limited number—only about 100—owners of 2004-2009 Priuses to turn their car into a plug-in hybrid. According to some reports, the rebates can only be obtained at luxury car dealer Foreign Affairs Auto in West Palm Beach, which was named the only authorized A123 Systems/Hymotion conversion kit dealer in May 2009.

For more information, please contact the Florida Division of Motor Vehicles at this Web site: dmv@hsmv.state.fl.us [11] or (850) 922-9000.

Georgia Hybrid and EV Incentive

Georgia offers income tax credits of up to 20 percent of the cost of an electric car—maximum of $5,000—or 10 percent (with a max of $2,500) for a car conversion that will use an "alternative fuel" including electricity.

An income tax credit is available to any eligible business enterprise for the purchase or lease of each EV charger that is located in the state. The amount of the credit is 10% of the cost of the charger or $2,500, whichever is less. (Reference Georgia Code 48-7-40.16)

Contact: James Udi, Environmental Specialist, Georgia Environmental Protection Division, james_udi@dnr.state.ga.us [12].

Hybrid electric vehicles (HEVs) shall be authorized to use high occupancy vehicle lanes, regardless of the number of passengers, if the U.S. Congress or U.S. Department of Transportation approve such authorization through legislative or regulatory action. (Reference Georgia Code Section 32-9-4) The term 'alternative fuel vehicle' is expanded to include HEVs. A HEV is defined as a motor vehicle, which draws propulsion energy from onboard sources of stored energy, which include an internal combustion or heat engine using combustible fuel and a rechargeable energy storage system. HEVs must also meet federal Clean Air Act and California emissions standards and must have a fuel economy that is 1.5 times the Model Year 2002 EPA composite class average for the same vehicle class.

Illinois Hybrid Tax Rebate

Under its Green Rewards program, the Treasurer's Office has committed $2 million in rebates to make high-mileage hybrid vehicles, which run on gasoline and electricity, more affordable. Illinois drivers are eligible for a $1,000 rebate with the purchase of a new hybrid or other fuel- efficient vehicle. Participating banks and credit unions agree to accept a discounted deposit rate from the state for one year in exchange for providing the $1,000 rebates to Illinois residents. For more information: www.treasurer.il.gov/cultivateillinois/greenrewards.aspx [13].

The Illinois Alternate Fuels Rebate Program (Rebate Program) provides rebates for 80% of the incremental cost of purchasing an AFV or converting a vehicle to operate on an alternative fuel. The maximum amount of each rebate is $4,000. Eligible vehicles include natural gas, propane, and electric. Gasoline-electric hybrid vehicles are not eligible.

Louisiana Tax Credit

The state offers an income tax credit worth 50 percent of the cost premium of an electric car, plug-in hybrid, or converting a vehicle. A taxpayer may instead take a tax credit worth 10% of the cost of the motor vehicle or up to $3,000, whichever is less. Similar credits are available

for charging equipment installation. (Reference House Bill 110, 2009, and Louisiana Revised Statutes 47:6035)

Maine Hybrid Tax Reduction

Maine's partial sales tax for hybrids expired on January 1, 2006. For questions, contact Melissa Morrill [14] at Maine Department of Environmental Protection.

Maryland Hybrid and EV Discounts

H.B. 61 exempts qualified hybrid electric vehicles from motor vehicle emissions testing requirements.

A tax credit is allowed against the excise tax imposed for the purchase of qualified hybrids and EVs. For qualified EVs, the tax credit may not exceed $2,000. A qualified EV must meet the definition set forth in the Internal Revenue Code. (Reference Maryland Statutes, Transportation Code 13-815)

Owners of hybrid cars will get discounts on parking at the 15 city-owned parking garages in Baltimore. The plan cuts between 32 and 85 dollars from the monthly fees for owners of the fuel-efficient vehicles. Baltimore will limit participation to 200 vehicles and the program will apply only to monthly, contract parking. Drivers of the three most fuel-efficient models can apply for a decal that will let them park in designated spots in the city's garages.

Massachusetts Hybrid Tax Cut

The town of Williamstown, Massachusetts launched a program that offers owners of 2003-2007 model hybrids and other fuel-efficient vehicles registered in the town a reimbursement grant of up to 75 percent of the state motor vehicle excise tax paid. Owners must obtain the grant application by visiting www.williamstown.net [15].

Michigan Hybrid Parking Perk

The City of Ferndale allows free parking at city meters for drivers of hybrids and other vehicles that average 30 miles per gallon or more in city driving. Owners of eligible automobiles must register and pay an annual fee in order to get a permit for the exemption. To find out if a car qualifies, call the City Assessor at (248) 546-2372.

Montana

A tax credit of $500 is available for an electric car conversion.

Nevada Hybrid Emissions Exemption

Hybrid cars that are less than five years old are exempt from the emissions program currently governing Clark and Washoe Counties.

New Mexico Hybrid Sales Tax Exemption and Parking Perk

Hybrid electric vehicles (HEVs) with a U.S. Environmental Protection Agency (EPA) fuel economy rating of at least 27.5 miles per gallon are eligible for a one-time exemption from the motor vehicle excise tax and state sales tax.

In Albuquerque, hybrid cars are exempt from parking meter fees. For more information, visit: http://www.cabq.gov/parking/HybridPermits.html [16]. Or call The City of Albuquerque's parking office at 505-924-3950. Contact Deborah James: Djames@cabq.gov [17] (505) 768-3036.

New Jersey Hybrid HOV Use--and EV Incentives

On May 4, 2006, the New Jersey Turnpike Authority, which administers the turnpike and the Garden State Parkway, voted to allow hybrid vehicles to use the high occupancy vehicles lanes on the turnpike. The ruling's effect may be limited since the turnpike, which sees an average of 700,000 drivers daily, has HOV lanes only between Interchange 11 in Woodbridge and Interchange 14 in Newark going both northbound and southbound. The Garden State Parkway does not have carpool lanes. Decals are not required. Turnpike Authority officials said state police do not anticipate any problems identifying which cars are hybrids.

Zero-emissions vehicles sold, rented, or leased in New Jersey are exempt from state sales and use tax. This exemption is not applicable to partial zero emission vehicles, including hybrid electric vehicles. ZEVs are defined as vehicles certified as such by the California Air Resources Board. (Reference New Jersey Statutes 54:32B-8.55)

New York Hybrid HOV Use

New York's Alternative Fuel (Clean Fuel) Vehicle Tax Incentive Program, which offered tax credits and a tax exemption for purchasing new hybrid electric vehicles (HEVs), have expired. In Jan. 2006, Governor Pataki proposed new incentives. For more information, please contact the New York State Energy Research & Development Authority (NYSERDA) at 866-NYSERDA, via email at info@nyserda.org [18], or visit the Web site: www.nyserda.org [19].

Clean Pass [20] is a program allowing eligible low-emission, energy-efficient vehicles to use the 40-mile Long Island Expressway High Occupancy Vehicle (LIE/HOV). Clean Pass is a multi-agency pilot program partnering three New York State agencies, the State Department of Transportation (NYSDOT), the State Department of Motor Vehicles (DMV), and State Department of Environmental Conservation (DEC). The number to inquire about a Clean Pass sticker is (518) 486-9786, Option 7.

Hybrid owners in Westchester County are allowed to park for free at two county-owned commuter lots. The cost of a monthly permit is usually $75. For more information, contact County Legislator Martin Rogowski at mlr1@westchestergov.com [21].

Oklahoma

For tax years beginning before January 1, 2015, Oklahoma provides a one-time income tax credit for 50 percent of the cost of converting a vehicle to operate on an alternative fuel such as electricity, or for 50 percent of the incremental cost of purchasing a new electric-drive vehicle. The state also provides a tax credit for 10 percent of the total vehicle cost, up to $1,500, if the incremental cost of the vehicle cannot be determined. For qualified electric vehicles propelled by electricity only, the credit is based on the full purchase price of the vehicle. For vehicles equipped with an internal combustion engine, such as a hybrid electric vehicle, the credit is based on the portion of the motor vehicle, which is attributable to the propulsion of the vehicle, by electricity. For more information, see Oklahoma Income Tax Form 511CR (PDF 219 KB). (Reference House Bill 1949, 2009, and Oklahoma Statutes 68-2357.22)

Oregon Tax Credit

A Residential Tax Credit of up to $1,500 is available for the purchase of a HEV or dual-fuel vehicle. For more information, contact Deby Davis of the Oregon Department of Energy at (503) 378-8351, via email at deby.s.davis@state.or.us [22]. Detailed information about qualifying vehicles is at this Web site: egov.oregon.gov/ENERGY/TRANS/hybridcr.shtml [23].

A Business Energy Tax Credit is available for the purchase of hybrid electric vehicles (HEVs) and dual-fuel vehicles, the cost of converting vehicles to operate on an alternative fuel, and the cost of constructing alternative fuel refueling stations. The tax credit is 35% of the incremental cost of the system or equipment and is taken over five years.

Pennsylvania Hybrid Tax Rebate

Pennsylvania's Department of Environmental Protection will offer an opportunity to Commonwealth residents to apply for a rebate to assist with the incremental cost for the purchase of a new hybrid, bi-fuel, dual-fuel or dedicated alternative fuel vehicle. The rebate amount is $500 [24]. The rebate will be offered as long as funds are available. Rebates will be offered on a “first come, first served” basis. Rebate applications shall be submitted no later than six months after the purchase.

A press release was issued by the Commonwealth of Pennsylvania on March 9, 2006. The program was so successful, the state expected to run out of rebate money sometime in April. DEP Secretary Kathleen A. McGinty said the commonwealth already has awarded more than $1.3 million in rebates from the $1.5 million allotted for the program for the 2005-06 fiscal year. Another $1 million will become available for the fiscal year beginning July 1. Because buyers have six months from the time of the purchase to apply for the rebates, people buying hybrid electric and alternative fuel vehicles after the current funding runs out still will be able to apply for rebates when the programs reopens. For more information, visit www.dep.state.pa.us [25].

South Carolina Sales Tax Credit

Consumers buying hybrid vehicles are provided a state tax credit equal to 20 percent of the federal tax credit scheduled to begin in tax year 2006.

The South Carolina Energy Freedom and Rural Development Act provides a sales tax rebate for the purchase or lease of fuel efficient vehicles beginning after June 30, 2008 and ending before June 30, 2013. It provides $300 for the in-state purchase of a hybrid vehicle, an electric vehicle, a plug-in hybrid vehicle, flex-fuel vehicle (FFV) capable of operating on E85, or a vehicle with an EPA city fuel economy rating of 30 mpg or higher. Up to $500 is allowed for the purchase of equipment for conversion of a conventional hybrid electric vehicle to a plug-in hybrid electric vehicle. For taxable years 2007-2010, it allows a $2,000 tax credit against the income tax imposed for the in-state purchase or lease of a plug-in hybrid vehicle.

Tennessee Hybrid Sales Tax Cut

There is no reduced sales tax on hybrids in the state of Tennessee. Although the bill was proposed, it did not pass the General Assembly. Not all hybrids are allowed to operate in HOV lanes without having to satisfy the two-passenger minimum requirement. Only "inherently low-emission vehicles" and "low-emission and energy efficient vehicles" as determined by the EPA meet this criterion. View these autos and find more information about the state's Smart Pass program online at www.tennessee.gov/revenue/vehicle/hovpass.htm [26].

Texas Clean Car Parking Incentive

The City of Austin's "Drive Clean--Park Free" program gives city-registered owners of hybrid vehicles that receive an EPA air pollution score of 8 or better a $100 pre-paid parking card to park in any of the city's 3,700 parking meters. Owners must submit an application to the city and receive a bumper sticker showing their participation in the program. Eligible vehicles must be purchased at certified dealerships within the Austin City Limits. For more information go to: www.ci.austin.tx.us/airquality/parkfree.htm [27].

The City of San Antonio allows owners of hybrid vehicles to park for free at street parking meters. A city ordinance, which took effect immediately after City Council approval on May 4, 2006, requires all owners wishing to take advantage of the one-year pilot program to register their hybrid vehicles with the City's Parking Division located at 243 N. Center Street. Registered hybrid vehicle owners can park at any of the City's 2,010 street parking meters without charge, including the pilot Pay & Display locations. All drivers must follow street parking meter rules such as parking for only the time allotted at the respective meter. For more information, call (210) 207-8266.

Utah Clean Fuel Tax Credits and Use of Carpool Lanes

The state provides an income tax credit up to $750 for a plug-in vehicle and up to $2,500 for a conversion. For details, contact Mat Carlile, Energy Program Coordinator, Utah Department of Environmental Quality, Division of Air Quality, mcarlile@utah.gov [28].

Vehicles with clean fuel group license plates are authorized to travel in HOV lanes regardless of the number of occupants. The clean fuel plate may be purchased for $15 from any Motor Vehicle Division office by presenting a clean special fuel certificate. This incentive expires December 31, 2010, as extended by 2005 House Bill 96. For more information, please contact the Utah State Tax Commission's Motor Vehicle Division at (800) DMV-UTAH or (801) 297-7780, or visit: dmv.utah.gov/licensespecialplates.html [29].

The state's tax credit for "electric-hybrid" is no longer active.

Salt Lake City grants free-metered parking to vehicles powered solely by an alternative fuel (i.e. propane, compressed natural gas, or electricity) or that are "top performers" in regards to city fuel economy or emissions. All available hybrids qualify. For details, including information about "Green Vehicle" parking permits, please visit this Web site: www.slcgov.com/transportation/parking/green.htm [30].

Virginia Clean Fuel Express Lanes

On March 20, 2007, Virginia Gov. Timothy M. Kaine signed into law an extension that will give vehicles with "clean special fuel vehicle" license plates special access to express lanes. These vehicles are allowed to drive in high occupancy toll lanes with only one passenger, but the rules, qualifying roadways and vehicles have been reviewed on an annual basis.

For more information and a list of qualifying vehicles, please visit the Virginia Department of Motor Vehicles Web site: www.dmv.state.va.us/webdoc/citizen/vehicles/cleanspecialfuel.asp [31].

Washington High-MPG Sales Tax Exemption

Effective January 1, 2009 through until January 1, 2011, state sales taxes do not apply to sales of new passenger cars, light duty trucks, and medium duty passenger vehicles, which utilize hybrid technology and have an EPA estimated highway gasoline mileage rating of at least forty miles per gallon. "Hybrid technology" is defined as propulsion units powered by both electricity and gasoline.

Electric, CNG, and LPG vehicles are exempt from emission control inspections. Effective June 13, 2002, hybrid motor vehicles that obtain a rating by the U.S. Environmental Protection Agency of at least 50 miles per gallon of gas during city driving are also exempt from these inspections.

Electric vehicles are exempt from the 6.5 percent sales tax and plug-in hybrids are exempt from the 0.3% motor vehicle sales tax. Tax exemptions also apply to charging station equipment and service. These tax exemptions expire on January 1, 2011.

West Virginia Alternative Fuel Tax Credit

The State of West Virginia allows a credit for the purchase of a new motor vehicle that runs on an alternative fuel or for the conversion of a traditionally fueled motor vehicle to an alternatively fueled motor vehicle. Alternative fuel types include compressed natural gas, liquefied natural gas, liquefied petroleum, methanol, ethanol, coal-derived liquid fuels, electricity, solar energy and fuel mixtures containing at least 85 percent alcohol. The tax department includes hybrids in this tax credit. Participants in this program can print out the necessary tax form [32]. For more information please visit this Web site: www.state.wv.us/taxdiv/ [33].

CANADA

Quebec Hybrid Tax Rebate

Quebec's most recent financial budget, passed in March 2006, includes a new tax rebate of up to $1,000 (CAD) for people who buy or lease hybrid vehicles. To be eligible for the rebate, the vehicle must use no more than six litres of gas per 100 kilometres (roughly equivalent to 40 mpg).

British Columbia, Ontario or Prince Edward Island - Hybrid Sales Tax Rebate

Residents of these three provinces are eligible for partial sales tax rebate on all hybrid vehicles. In British Columbia, residents can receive a rebate of up to $2,000, in Ontario up to $1,000 and in Prince Edward Island up to $3,000. These rebates are apparently for all hybrids, regardless of make or model. Participants should check with regional tax authorities or a tax professional.

Manitoba Tax Rebate

The provincial government of Manitoba gave $2,000 cash to anyone who buys or leases an eligible hybrid car between Nov. 15, 2006 and Nov. 15, 2008.

Links:
[1] http://www.servicearizona.com
[2] http://www.hybridcars.com/local-incentives/carpool-hov-lanes.html
[3] mailto:jason.burton@ci.sj.ca.us
[4] http://ladot.lacity.org/tf_Clean_Air_Vehicles.htm
[5] http://www.revenue.state.co.us/main/home.asp
[6] http://www.revenue.state.co.us/fyi/html/income09.html
[7] http://www.aircarecolorado.com/countyoffices.htm
[8] mailto:DSlap@Newhavenct.net
[9] mailto:Elizabeth.Berry@dc.gov
[10] mailto:Corey.Buffo@dc.gov
[11] mailto:dmv@hsmv.state.fl.us
[12] mailto:james_udi@dnr.state.ga.us

[13] http://www.treasurer.il.gov/cultivateillinois/greenrewards.aspx
[14] mailto:Melissa.Morrill@maine.gov
[15] http://www.williamstown.net
[16] http://www.cabq.gov/parking/HybridPermits.html
[17] mailto:Djames@cabq.gov
[18] mailto:info@nyserda.org
[19] http://www.nyserda.org/
[20] http://www.dot.state.ny.us/traffic/its/cleanpassintro.html
[21] mailto:mlr1@westchestergov.com
[22] mailto:deby.s.davis@state.or.us
[23] http://egov.oregon.gov/ENERGY/TRANS/hybridcr.shtml
[24] http://www.dep.state.pa.us/dep/deputate/pollprev/afig/HybridAFV_Rebate.htm
[25] http://www.dep.state.pa.us/
[26] http://www.tennessee.gov/revenue/vehicle/hovpass.htm
[27] http://www.ci.austin.tx.us/airquality/parkfree.htm
[28] mailto:mcarlile@utah.gov
[29] http://dmv.utah.gov/licensespecialplates.html
[30] http://www.slcgov.com/transportation/parking/green.htm
[31] http://www.dmv.state.va.us/webdoc/citizen/vehicles/cleanspecialfuel.asp
[32] http://www.state.wv.us/taxrev/uploads/wvafmv-1.pdf
[33] http://Clean Pass is a program allowing eligible low-emission, energy-efficient vehicles to use the 40-mile Long Island Expressway High Occupancy Vehicle (LIE/HOV). Clean Pass is a multi-agency pilot program partnering three New York State agencies, the State Department of Transportation (NYSDOT), the State Department of Motor Vehicles (DMV), and State Department of Environmental Conservation (DEC).

Appendix 8

The Massachusetts Smart Growth/Smart Energy Program

The Massachusetts Smart Growth / Smart Energy Program

This appendix was taken verbatim from the following Web site: www.mass.gov/envir/smart_growth_toolkit/pages/state-policy.html. It provides links to additional information not given below.

Every day we make important choices about where and how we will grow in Massachusetts. These decisions have profound implications for our environment, economy, and society. While we have made progress, more needs to be done to ensure that the interests of future generations are not compromised by today's decisions. The state is working to fulfill its smart growth/smart energy responsibilities so that it can be a full partner with communities, conservation organizations, and the development industry. Primary goals include incorporating the Sustainable Development Principles into the policies and programs of all agencies in order to lead by example in regard to clean energy and other issues, and ensuring that state infrastructure investments encourage smart growth instead of subsidizing sprawl.

It will take our cooperative efforts to build a greater quantity and diversity of housing, develop the businesses we need to provide jobs and increase revenue, reduce energy consumption, and improve our stewardship of the Commonwealth's natural resources. The Patrick Administration seeks to work in partnership with all interested stakeholders to improve the Commonwealth's conservation and development practices. We will strive to ensure that state policies, programs, and investments encourage smart growth/smart energy and ask municipalities and others to do the same. In addition, recognizing that time, effort, and funding are necessary to produce better plans and land use regulations, the Commonwealth will provide tools and financial and technical assistance.

The Smart Growth / Smart Energy Webpage:
www.mass.gov/?pageID=gov3subtopic&L=4&L0=Home&L1=Key+Priorities&L2=Job+Creation+%26+Economic+Growth&L3=Clean+Energy+%26+Smart+Growth-Smart+Energy&sid=Agov3

The Patrick Administration's Smart Growth/Smart Energy Program includes:

Smart Growth/Smart Energy Webpage

Information on the smart growth/smart energy efforts of the Administration is available on Governor Patrick's website. This page is home to relevant policy statements, grant announcements, and other information on policies and programs.

Development Cabinet

In June 2007 Governor Patrick issued Executive Order 487 formally creating the Development Cabinet. Chaired by the Governor, the Cabinet draws together the Lieutenant Governor and the Secretaries of Administration and Finance, Energy and Environmental Affairs, Housing and Economic Development, Labor and Workforce Development, and Transportation and Public Works for bi-weekly discussions. In an effort to break down "silos" in state

government the Cabinet works to identify opportunities where secretariats can work together. This is resulting in better coordination among agencies, greater government efficiency and effectiveness, and enhanced transparency of the day-to-day workings of the Commonwealth.

Sustainable Development Principles

The Patrick Administration has released a set of Sustainable Development Principles that guide the creation and implementation of state agency policies and programs, as well as investments in land and infrastructure. The Principles can be found on the Governor's website. Municipalities, through policies like Commonwealth Capital, are also asked to modify their planning, regulatory, and funding actions to achieve consistency with the Principles.

The state's Sustainable Development Principles include promoting clean energy, in the form of energy efficiency and renewable power generation, in order to reduce greenhouse gas emissions and consumption of fossil fuels. They also encourage the creation of "pedestrian-friendly" districts and neighborhoods that mix commercial, civic, cultural, educational, and recreational activities with parks and homes. In regard to housing, the Principles call for building homes "near jobs, transit, and where services are available."

Commonwealth Capital Policy

Commonwealth Capital encourages communities to grow smart by explicitly endorsing planning and zoning measures that are consistent with the Sustainable Development Principles and pushing municipalities to implement them by using state funding as an incentive. The more smart growth/smart energy oriented a community is, the more likely it is to receive funding. Municipal smart growth/smart energy policies and actions are assessed through a Commonwealth Capital application; the resulting scores are part of the proposal evaluation process for Commonwealth Capital grant and loan programs. New criteria, including several related to municipal energy practices, have been included in Commonwealth Capital for fiscal year 2008.

Smart Growth / Smart Energy Awards

Across the Commonwealth cities and towns, often in partnership with developers, non-profit and civic groups, and other organizations, have taken a leadership role in the implementation of smart growth / smart energy. The Governor's Smart Growth / Smart Energy Awards honor those communities and the organizations that support them, and recognize their efforts as models for all 351 cities and towns in Massachusetts. These awards encourage continued innovation and creativity by shining a spotlight on those municipalities whose efforts and accomplishments are truly exemplary.

Smart Growth / Smart Energy Conference

All interested parties are invited to join the Administration in this annual day-long event that provides the latest information on smart growth policies and programs. Speakers address the

spectrum of smart growth / smart energy related topics, focusing on providing tools and information that can be implemented in communities across the Commonwealth.

Technical and Financial Assistance

The agencies of the Development Cabinet provide expertise and assistance, as well as funding, to those who would like to plan, design, regulate, invest, and/or build smart growth / smart energy. Programs and staff from throughout state government have the expertise and ability to provide technical assistance to those interested in economic development, housing, energy, environment, transportation, and other areas. Providing communities with assistance to redraft their land use regulations is particularly important to achieving the Administration's smart growth goals.

Smart Growth / Smart Energy Toolkit

The enhanced Smart Growth / Smart Energy Toolkit is a focal point for Patrick Administration technical assistance efforts. Agency staff will be working with communities to ensure that the new Toolkit modules incorporated in 2007: business improvement districts, environmental justice, form based codes, mill revitalization districts, outreach and education, smart energy, smart parking, wastewater alternatives, wind power, and zoning decisions; as well as the previous twelve, are familiar to local land use decision makers.

Land Conservation

A balanced approach to smart growth requires both land conservation and the concentration of development. Therefore, the Patrick Administration will invest at least $50 million annually to preserve land over the next five years. Funding will be utilized to accomplish three top priorities:

* Commonwealth Urban Parks - creation of visionary new large urban parks in underserved neighborhoods in 10 to 15 cities, as well as new or expanded urban parks in all 51 of our cities over the next four years;
* Commonwealth Habitat Reserves - protection of at least 10 large unfragmented ecosystems across the state; and
* Commonwealth Working Landscapes - conservation of prime agricultural and forest lands that support local, sustainable agriculture and forest industries.

Smart Energy

Recognizing the importance of reducing fossil fuel dependency and the connection between land use and energy consumption the Patrick Administration, led by the Executive Office of Energy and Environmental Affairs, is pursuing a variety of policies and programs to encourage energy conservation, efficiency, renewable energy generation, and clean energy technologies.

Regional Greenhouse Gas Initiative (RGGI)

The Commonwealth has joined the RGGI cap-and-trade program, a cooperative effort by Northeastern and Mid-Atlantic states to reduce carbon dioxide emissions (the most abundant greenhouse gas) from electrical power plants. Scientists predict that climate change could raise sea levels, change precipitation, and impact other local climate conditions. Changing regional climate could in turn alter forests, crop yields, and water supplies as well as affect human health, animals, and many types of ecosystems. To address this critical environmental issue, beginning in 2009 the RGGI participating states will implement a regional cap-and-trade system, requiring electric power generators in participating states to reduce carbon dioxide emissions.

Climate Registry

Massachusetts joined 31 states, one Native American tribe, and two Canadian provinces as founding members of The Climate Registry, a multi-state effort to track greenhouse gas emissions. A newly formed nonprofit organization will assist in measuring, tracking, and verifying emissions of greenhouse gases, the gases that cause climate change. It will also provide the measurement and reporting infrastructure to support voluntary, mandatory, market-based and emissions reduction programs that are consistent across borders and industry sectors.

Massachusetts Environmental Policy Act (MEPA) Greenhouse Gas Emissions Policy

The Executive Office of Energy and Environmental Affairs (EEA) has determined that the phrase "damage to the environment" as used in the Massachusetts Environmental Policy Act (MEPA) includes the emission of greenhouse gases caused by projects subject to MEPA review. EEA has developed a new policy that requires large projects undergoing review by the MEPA Office to quantify the project's greenhouse gas (GHG) emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying project-related GHG emissions, the Policy also requires proponents to quantify the impact of proposed mitigation in terms of emissions and energy savings.

Model Wind Bylaws

EEA and the Division of Energy Resources have developed and posted on the DOER website and included in the Smart Growth / Smart Energy Toolkit model wind zoning bylaws to assist Massachusetts cities and towns in establishing reasonable standards for wind development. The agencies will work with interested parties to implement the bylaws.

Cambridge Energy Alliance (CEA) and MassEfficiency Program

The Patrick Administration supported recent establishment by the City of Cambridge of the CEA program to reduce energy and water consumption in residences, businesses, and institutions. The Administration will be working to replicate the CEA model in five additional Massachusetts cities through the recent creation of the MassEfficiency Program which provides a revolving loan fund to finance start-up costs.

Chapter 43D - Expedited Permitting

Chaired by the Commonwealth's Permitting Ombudsman, the Interagency Permitting Board reviews priority development site proposals from Massachusetts municipalities and then, through grants and technical assistance, helps them modify permitting processes for approved sites to provide efficient decisions on development proposals.

Growth Districts

The Massachusetts Permit Regulatory Office, in partnership with municipalities, will work to identify appropriate locations for significant new growth, whether commercial, industrial, or mixed-use. In these locations the Administration will work with community officials and property owners to make the district truly "development ready" with respect to local and state permitting, site preparation, infrastructure improvements, and marketing. The goal is to make suitable "growth districts" highly attractive to new development and truly competitive at a national and international level with respect to speed and ease of permitting.

40R/40S

These statutes provide a financial incentive to implement "smart growth zoning districts." These districts promote higher density housing and mixed-use development in appropriate places - city and town centers, transit stops, and other highly suitable locations. Staff from the Department of Housing and Community Development as well as other Development Cabinet agencies will aid communities in understanding and adopting smart growth districts pursuant to Chapter 40R.

Planning and Zoning Reform Task Force

Recognizing the need for planning and zoning reform the Patrick Administration, in concert with legislative leadership, has convened a task force. The Executive Office of Housing and Economic Development is leading a group of administration officials, legislators, and stakeholders in an effort to reach agreement on a package of reforms that will modernize the Commonwealth's planning, subdivision, and zoning statutes in ways that are consistent with smart growth.

South Coast Rail - Economic Development and Land Use Corridor Plan

In preparation for the restoration of rail service this project will produce an economic development and land use plan for the South Coast Rail Corridor. The plan will recommend ways the state and municipalities can partner to maximize the economic development potential of the corridor, create sustainable development, avoid sprawl, and generate new revenues for corridor communities and the Commonwealth.

Highway Design Manual

The Patrick Administration encourages use of the Massachusetts Highway Department Project Development and Design Guidebook that promotes context-sensitive design, accommodation of all transportation modes, and traffic calming. Produced through a collaborative process, it is among the most progressive in the country and reflects a focus on achieving smart growth via better day-to-day decisions.

Transit Oriented Development (TOD)

Mixed-use and high-density development designed to take advantage of transit can reduce energy consumption and provide needed housing and economic development in a smart growth consistent way. In order to promote transit-oriented development the Patrick Administration will plan and construct transit infrastructure such as the South Coast Rail line to Fall River and New Bedford. It will also encourage local governments to zone for TOD by providing technical assistance and a model bylaw and other information through the Smart Growth/Smart Energy Toolkit.

In summary, policies, programs, and investments by state, regional, and local governments as well as corporations and individuals all play an important part in determining our quality of life, as well as that of future generations. The Patrick Administration efforts outlined here are intended to ensure that state government effectively fulfills its responsibility to care for the natural and built environments of Massachusetts.