FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS

FLORIDA ENERGY OFFICE

CLEAN FUEL FLORIDA ADVISORY BOARD

Cornerstone Report 2003

CLEAN FUEL FLORIDA ADVISORY BOARD

Cornerstone Report

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JANUARY 2003

EXECUTIVE SUMMARY

Clean Fuel Florida Advisory Board Cornerstone Report 2003

CLEAN FUEL FLORIDA ADVISORY BOARD CORNERSTONE REPORT

Executive Summary

In 1999, Florida's Legislature passed the Florida Clean Fuel Act for the purpose of establishing the Clean Fuel Florida Advisory Board to study the implementation of alternative-fuel vehicles and to formulate and provide the Governor, the Secretary of the Department of Community Affairs and the Florida Legislature with recommendations on expanding the use of alternative-fuel vehicles in this state and make funding available for implementation.

To that end, the Clean Fuel Florida Advisory Board is submitting its three-year findings on Florida's use of alternative-fuel vehicles, and making recommendations to increase the use of alternative fuels and alternative-fuel vehicles in Florida. The report presents a background of the need to expand alternative fuel use in Florida and provides a set of recommendations to set in motion a comprehensive transportation energy plan for the State. Increased alternative fuel use can have a number of positive outcomes; enhanced quality of life, continued economic prosperity, a diversified fuel supply, and a reduced dependence on foreign oil.

Rapid technological change and vehicle development have resulted in major advances in alternative fuels and alternative-fuel vehicles, providing "low cost" readily available alternatives that can utilize existing refueling infrastructure together with environmental gains and reductions in foreign energy dependence. Emerging technologies, such as hydrogen and fuel cells, focus on unlimited resources of energy and virtually zero emissions, however require further development to bring them to commercial market status.

The report delivers three key messages:

- Florida needs to ***expand its use of alternative fuels and alternative-fuel vehicles*** while sustaining economic growth and providing collateral benefits to the state and hence, the nation
- Florida needs to ***take action to remove obstacles to the development of a sustainable alternative fuel market*** that is needed to support a thriving alternative fuel industry and
- Florida needs to ***provide direction for strategic investments*** to enhance Florida's energy security and improve the environmental quality in the state.

Promoting a comprehensive, sustainable and viable program of alternative fuel use offers large potential rewards for Florida with minimal risk. Expanded use of alternative fuels also reduces the nation's dependence upon imported oil, enhancing energy security. The State can benefit environmentally through cleaner air, and a lower risk of groundwater contamination, and can benefit economically through the local production of fuels and the possibility of becoming an energy exporter.

In the report, the Clean Fuel Florida Advisory Board provides eight specific recommendations through which the foundation for a comprehensive transportation energy plan can be set in place. Implementation of these recommendations will:

- Support and enhance Florida's alternative-fuel vehicles Infrastructure,
- Create an organizational structure to support expanded alternative-fuel vehicles use,
- Expand levels of public awareness and general understanding of transportation issues, and
- Garner the support for research into the best application of emerging technologies such as hydrogen and fuel cells.

RECOMMENDATIONS:

1. Emerging Transportation Technology Business Development:

Host Alternative Fuels and Advanced Transportation Technologies summit; the State must create heightened awareness and incentives for private sector involvement. This is essential to communicating clearly the highly desirable market opportunities that Florida possesses and to creating leveraged funding opportunities with non-government organizations and the private sector.

2. Government Agency Leadership:

Adopt rules for State fleets to achieve original EPACT intent of greater alternative fuel use; the critical mass of alternative-fuel vehicle activity and has not been achieved through EPACT. Therefore a set of rules that would shift focus to fuel use and gasoline/diesel displacement rather than vehicle acquisition will achieve the original intent of greater alternative fuel use with broader flexibility in vehicle choice and minimal fiscal impact.

3. Alternative-fuel Vehicle Infrastructure and Vehicle Program Development:

Dedicated source(s) of funds for alternative-fuel vehicle infrastructure research, development and implementation; concurrent with creating a marketplace for increased alternative-fuel vehicle use to encourage public/private partnerships in developing a broad infrastructure base to support alternative-fuel vehicle deployment.

4. Planning Code and Regulations:

Workshops to assist in developing alternative fuel vehicle regulations and infrastructure needs; to include better integration of alternative fuel vehicle refueling infrastructure plans, zoning and code provisions, and draw upon successful experiences in Florida, including workshops for planners and regulators from local regulatory and policy-making entities.

5. Transportation System Funding:

Study to develop a methodology to provide a revenue stream for transportation infrastructure; understanding that successful implementation of alternative-fuel vehicle programs could have an impact on State fuel tax revenues, which help fund its roadway system. Traditional means of funding roadways through gasoline taxes are already strained.

6. Clean Fuel Transit Systems;

Develop education and outreach programs related to alternative fuel transit; as a number of alternative fuel technologies such as bio-diesel, hybrid electric, and battery electric drive trains are ideally suited to certain transit and paratransit applications and can reap immediate benefits of reductions in emissions and dependence upon foreign oil.

7. Education and Outreach:

Education and outreach on an on-going statewide basis; as research has highlighted the limited extent of understanding that many industry experts, policy makers, planners, legislative staff, elected officials and the general public have of the specifics of alternative fuel use.

8. State Energy Office:

Staffing, funding and leadership role of Florida Energy Office; as the need for a strong Energy Office is critical as the nation faces the many challenges related to transportation energy security and funding.

Clean Fuel Florida Advisory Board

Membership

JANUARY 2003

Steve Somerville, Chair
Broward County Department of Planning & Environmental Protection

Ed Coven, Vice Chair
Florida Department of Transportation

Patricia Asseff
Gold Coast Clean Cities

Terrill Booker
Tallahassee Natural Gas Department

Roosevelt Bradley
Miami-Dade Transit Agency

Rosalyn Bruce
Florida Department of Management Services

David E. Bruderly
Bruderly Engineering Association

Robert G. Burleson
Florida Transportation Builders Association

Julia Cope
EV Ready Broward

Donald Crane, Jr.
Floridians for Better Transportation

Jim Davis
OceanAir Environmental

William (Bill) Davis
Florida Department of Environmental Protection

Jo Ann Hutchinson
Commission for the Transportation Disadvantaged

Bill Jones
American Planning Association

David R. Mica
Florida Petroleum Council

Vicki O'Neil
Florida Department of Agriculture & Consumer Services

Kathleen A. Randall
BP Amoco Corporation

Rocky Randels
Florida League of Cities

G. David Rogers
Florida Propane Gas Association

Robert Schomber
Florida Power and Light Company

William R. Schroyer
Florida Department of Education

Steve Simon
Florida Association of Counties

Alberta Simmons
Enterprise Florida, Inc.

J. Bryan Taylor
Ford Motor Company

John Thomas
Florida Institute of Technology

Harold L. Young
Miami-Dade County Public Schools

William Young, Jr.
Space Coast Clean Cities

Introduction

CHAPTER 1

Introduction

This report presents a background of the need to expand alternative fuel use in Florida and provides a set of recommendations to set in motion a comprehensive transportation energy plan for the State. Increased alternative fuel use can have a number of positive outcomes; enhanced quality of life, continued economic prosperity, a diversified fuel supply, and a reduced dependence on foreign oil.

The Clean Fuel Florida Advisory Board has been established through the year 2004. The culmination of three years of effort by the Board, this report to the Department of Community Affairs on behalf of the Florida Energy Office, outlines the benefits expanded alternative fuel use can bring to Florida, highlights the need to consider and act upon implementation of alternative fuel programs in the immediate future, and provides background on the mission of the Clean Fuel Florida Advisory Board. Additionally, this report recommends specific actions in the mid and long term that will remove obstacles to the development of a sustainable alternative fuel market in Florida, create a business and consumer environment to support a thriving alternative fuel industry, provide direction for strategic investments to facilitate economic growth, improve air quality and reduce dependence on imported oil.

Alternative Fuels have traditionally included natural gas, (both liquid and compressed), propane, electricity, bio-diesel (diesel fuel produced from a source other than petroleum, alone or mixed with traditional diesel), alcohol, (both methanol and ethanol, alone or mixed with gasoline), hydrogen, and synthetic fuels. Vehicles that use these fuels are regarded as alternative-fuel vehicles. Vehicles using advanced drivetrain technologies such as fuel cells or hybrid-electric vehicles—which use both a traditional gasoline or diesel engine in conjunction with an electric motor—are also generally considered to be alternative-fuel vehicles.

Rapid technological change and vehicle development have resulted in major advances in alternative-fuel vehicles. The alternative fuel industry can be viewed as having three categories of vehicles and technologies, each with specific and viable applications. Traditional alternative fuels, such as natural gas and propane, have a place in centralized fleet situations and offer the promise of efficient, cost effective home refueling. Transitional fuels, such as ethanol and bio-diesel, provide environmental gains and reductions in foreign energy dependence, and are a "low cost" readily available alternative that can utilize existing refueling infrastructure. Emerging technologies, such as hydrogen and fuel cells, focus on unlimited resources of energy and virtually zero emissions, though require further development to bring them to commercial market status.

Promoting a comprehensive, sustainable and viable program of alternative fuel use offers large potential rewards for Florida with minimal risk. Expanded use of alternative fuels also reduces the nation's dependence upon imported oil, enhancing energy security. The State can benefit environmentally through cleaner air, and a lower risk of groundwater contamination, and can benefit economically through the local production of fuels and the possibil-

ity of becoming an energy exporter. By leveraging the leadership role of the NASA program, Florida can attract investment and higher income jobs as a leader in hydrogen and fuel cell development and production.

In this report, the Clean Fuel Florida Advisory Board has identified a number of areas in which the foundation for a comprehensive transportation energy plan incorporating alternative fuels can be set in motion. These range from Florida taking a proactive role with key industry sectors, to providing leverage to federal and private sector funds for infrastructure development; coordination across state agencies, and planning for the needs and consequences of emerging technologies such as hydrogen and fuel cells. This report considers sociological, geopolitical, and technological factors that will impact the provision of a sustainable energy source for Florida's transportation system, while addressing the short, medium and long-term needs of the State. There is a need to act now to send a clear signal to industry that Florida is "open for alternative fuel business" and secure the necessary resources to meet the fueling needs of the State's transportation system.

MISSION AND BACKGROUND OF THE CLEAN FUEL FLORIDA ADVISORY BOARD

Governor Jeb Bush signed the Florida Clean Fuel Act into law in 1999.[1] The Act established the Clean Fuel Florida Advisory Board to study the implementation of alternative-fuel vehicles and formulate policy recommendations to the Secretary of the Department of Community Affairs on the expansion of their use.

This report is the culmination of a multi-year effort by the Clean Fuel Florida Advisory Board to present clear direction to the State to ensure a steady and predictable source of energy to fuel the Florida's transportation system.

The Clean Fuel Florida Advisory Board consists of representatives from energy industries, motor vehicle manufacturers, vehicle fleet managers, Florida citizenry, transportation professionals, economic development and environmental interests along with state agencies, local governments, and others interested in alternative fuels. In a statement adopted in the summer of 2000, the Clean Fuel Florida Advisory Board further refined its mission as:

> *"The Clean Fuel Florida Advisory Board, representing diverse private sector, public agency and citizen perspectives, studies, develops and promotes policy recommendations regarding the expansion of alternative-fuel vehicles in Florida."*

The Clean Fuel Florida Advisory Board also adopted a set of guiding principles to steer their deliberations and policy formulation:

1. BE FUEL INCLUSIVE

There are many potential markets for many different fuels, each with various benefits and applications. The Clean Fuel Florida Advisory Board recognizes this and has put aside parochial perspectives.

2. BUILD ON PAST WORK WHILE INCORPORATING CREATIVE IDEAS

The Clean Fuel Florida Advisory Board has been adamant not to "reinvent the wheel." The Clean Fuel Florida Advisory Board's efforts have focused on what alternative fuel programs have worked "where and why", and the Clean Fuel Florida Advisory Board has incorporated unique elements of Florida in developing recommendations.

3. FOCUS ON RESULTS

The Clean Fuel Florida Advisory Board has a clear definition of success and has articulated specific measures to assess progress in the future.

4. DEVELOP STATEWIDE POLICIES THROUGH CONSENSUS DECISION-MAKING

Given the diverse composition of the Clean Fuel Florida Advisory Board and the diverse interests represented, recognition that recommendations must be developed in a collaborative manner.

[1] The Clean Fuel Florida Advisory Board was established in 1999 by Section 403.42, *Florida Statutes*— the Florida Clean Fuel Act. The purpose of the board is to serve as a resource for the Department of Community Affairs and to provide the Governor, the Legislature and the Secretary of Community Affairs with private sector and other public agency perspectives on achieving the goal of increasing the use of alternative-fuel vehicles in the state. The statute enacts the board's existence for a period of 5 years.

In developing this report, the Clean Fuel Florida Advisory Board took care to address the statutory charge as provided in the Clean Fuel Act, Section 403.42, *Florida Statutes*. As written, the statute directs the Clean Fuel Florida Advisory Board to undertake the following:

403.42.2 IDENTIFY OBSTACLES AND INCENTIVES.

The advisory board shall assess federal, state, and local initiatives to identify incentives that encourage successful alternative fuel vehicle programs; obstacles to alternative fuel vehicle use including legislative, regulatory, and economic obstacles; and programs that educate and inform the public about alternative-fuel vehicles.

403.42.3 MOTOR FUEL TAXES AND ALTERNATIVE FUELS.

The advisory board is charged with determining a reasonable, fair, and equitable way to address current motor fuel taxes as they apply to alternative fuels and at what threshold of market penetration.

403.42.4 FINDINGS AND RECOMMENDATIONS ON FUTURE ALTERNATIVE FUEL PROGRAMS AND LEGISLATIVE CHANGES.

Based on its findings, the advisory board shall develop recommendations to the Legislature on future alternative fuel vehicle programs and legislative changes that provide the best use of state and other resources to enhance the alternative fuel vehicle market in this state and maximize the return on that investment in terms of job creation, economic development, energy security and emissions reduction.

The Clean Fuel Florida Advisory Board has diligently followed the direction of the Florida Legislature in conducting its work. In this report, together with the Clean Fuel Florida Advisory Board's previous reports (*The Strategic Fit of Alternative Fuels in Florida–January 2001*, and *Fueling Florida's Future; January 2002*)*, the Clean Fuel Florida Advisory Board has identified the obstacles to be overcome and the areas of support required to foster the deployment of a viable alternative fuel vehicle program. The Clean Fuel Florida Advisory Board has sought and will continue to pursue legislation (Appendix 1) to address a reasonable, fair, and equitable way to address motor fuel taxes. Furthermore, this report itself addresses the requirement for developing recommendations to the Legislature on programs and legislative changes to enhance the alternative-fuel vehicle market in this state.

Finally, the Clean Fuel Florida Advisory Board sees this report as the genesis for all Florida agencies to incorporate an understanding of the need to consider alternative fuel use in all activities, be it regulation or planning activities, or departmental use of vehicles. The primary audience of this report is those responsible for the direction of policy in Florida — high-level executive officials and departmental heads, policy makers and legislators. By providing the basis to link environment, energy and economic development, the Clean Fuel Florida Advisory Board seeks to promote a market-based approach incorporating government policy and consumer awareness to take advantage of economic development opportunities that alternative fuels can bring to Florida, and address the critical energy needs of the State.

*PDF files of these publications can be found on the Department of Community Affairs, Florida Energy Office's website: http://www.FloridaCommunityDevelopment.org/programs/sep/index.htm

Understanding the Need for Alternatives

CHAPTER 2

Understanding the Need for Alternatives

The fiscal demands and planning challenges of maintaining and developing a transportation system for one of the United States' most populous states is a daunting task. Florida ranks at or near the top in a number of particularly relevant transportation factors such as fuel use, vehicle miles traveled, population growth and urban densities. A review of the growth trends in Florida over the coming decades is a fundamental step in understanding the demands that will be placed on the State's transportation system, and the need to protect and develop Florida's investment in transportation infrastructure. Connecting these growth patterns to the demand for transportation highlights the need to introduce alternative sources of energy to foster growth and facilitate economic development.

Through a multiyear effort, the Clean Fuel Florida Advisory Board has identified not just why there is a need to consider expanding the use of alternative fuels in Florida, but also why Florida is a particularly good fit for the early introduction of transitional alternative fuels and emerging alternative-fuel vehicle technologies. The following discussion addresses where Florida stands in relative terms of population growth and densities, how the State's demographics are particularly well suited to a viable alternative-fuel vehicle market, how federal mandates have failed to impact the Florida motor vehicle fleet and achieve desired outcomes of reduced emissions and petroleum use; it examines the driving forces behind petroleum demand, reviews the environmental issues associated with continued growth in petroleum use, considers the near term technological outlook for alternative-fuel vehicles and examines the fundamental reality of the finite nature of petroleum based fuels.

Although many of the trends are a source of concern, the potential for addressing the State's needs with alternative fuels and alternative-fuel vehicles is promising. High levels of urban density, a large proportion of elderly, and overall high growth rates are all precursors for a viable alternative-fuel vehicle program where centralized refueling infrastructure, short trip lengths and growing markets are key to sustainable markets. Rapidly advancing developments in alternative fuel vehicle technologies mean viable solutions are close to commercialization. Florida is well positioned to take a leadership role and secure a sound economic future.

1. POPULATION

Six states were identified as peers to Florida using a statistical process known as Cluster Analysis. The purpose of cluster analysis is to organize observations (in this case Florida and other states) into groups, where members of the groups share properties in common. For the purpose of this report, transportation related factors such as population densities, population growth rates, vehicle miles traveled, fuel use, and vehicle registrations were considered. A full description of the Cluster Analysis process and the variables used to identify the peer states is provided in Appendix 2. Using the cluster analysis approach, the following states were found to be most similar to Florida (ranked in order of similarity);

- Pennsylvania
- Ohio
- New York
- Illinois
- North Carolina
- Michigan

This report will utilize the peer states as benchmarks for relative growth in population size and demographics, number of motor vehicle registrations, vehicle miles traveled, fuel demand and alternative-fuel vehicle activity.

A. Growth

Florida is one of the fastest growing states in the United States. The State is challenged with providing a level of infrastructure to support this growth and risks serious disruptions to continued economic

growth and prosperity unless a broad vision of transportation energy policy is adopted.

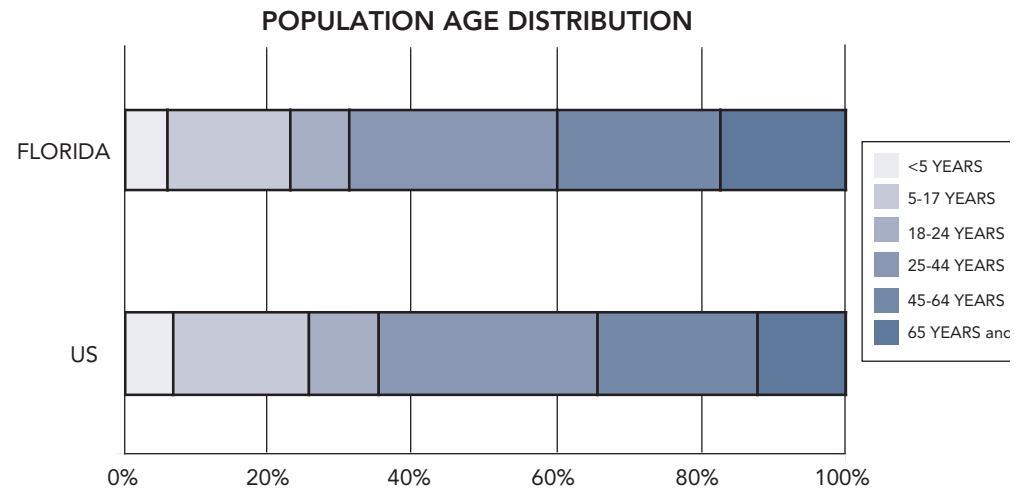
Using the most recent Census 2000 projections, Florida's population in 2001 was almost 16.4 million[1]. Using the average annual growth rate of population in Florida over the last decade the estimate for 2002 is almost 16.8 million. During the 1990's, Florida's population increased 3 million; only California and Texas grew by more during that decade. This represents nearly a 23.5 percent increase in population over that period, which is significant when compared to a national growth rate of only 13 percent. Should the current trend in the population growth continue as expected, the population of Florida will have increased 55 percent by 2022, reaching 25.5 million, and will have doubled by 2032.

Despite a recent slowing in the rate of growth in new residents, Florida remains one of the fastest growing states in the nation. Among the peer states identified using cluster analysis, Florida is by far the fastest growing state (Table 1).

Table 1: Peer State Population and Growth Rates

State	Population, 2000	Average annual growth rate, 1990-2000 (%)
Florida	15,982,378	2.1
Pennsylvania	12,281,054	0.3
Ohio	11,353,140	0.5
New York	18,976,457	0.5
Illinois	12,419,293	0.8
North Carolina	8,049,313	1.9
Michigan	9,938,444	0.7

Figure 1: Population Age Distribution, Florida vs. US



Source: U.S. Census Bureau, 2002

Florida remains the fourth largest state in the US behind California (population 33.9 million), Texas (population 20.9 million), and New York (population 19.0 million). Census Bureau projections are that Florida will become the nation's third largest state between 2015 and 2020.

B. Demographics

Currently, and for the foreseeable future, much of this growth comes from migration into Florida. In the 1990's over 85 percent of Florida's growth was from migration, with much of this from retirees. Already, persons aged 65 years or older comprise almost 18 percent of Florida's population, versus a little over 12 percent of the overall US population[2]. As early as 2010, this age group will comprise almost 20 percent of Florida's population (Table 2).

The proportion of older persons in Florida (Figure 1) is particularly significant for alternative-fuel vehicle deployment. Projections from the Commission for the Transportation Disadvantaged indicate considerable growth in demand for mobility options for the senior and disabled populations in Florida.

Table 2: Florida Population by Age Group[3]

Age Group	2000	2010	Percent Change
0-4	964,590	1,124,735	+ 16.6
5-17	2,698,895	2,875,406	+ 6.5
18-24	1,339,053	1,628,171	+ 21.6
25-44	4,565,761	4,426,683	- 3.0
45-64	3,619,912	5,295,212	+ 46.3
65-84	2,469,342	3,048,141	+ 23.4
85+	324,825	468,339	+ 44.2
TOTAL	15,982,378	18,866,687	+ 18.0

[1] US Census Bureau; http://quickfacts.census.gov/qfd/states/12000.html

[2] US Census Bureau 2000

[3] US Census Bureau 2000

Typically, widespread use of many types of alternative-fuel vehicles is limited by range and access to refueling infrastructure. However, Neighborhood Electric Vehicles are commercially available for use on roadways that are speed limited to 35 mph, and have a range typically of 50 – 75 miles before the need to recharge, neither factor is a restriction to the typical mobility demands of senior and disabled populations. The use of Neighborhood Electric Vehicles in closed communities and retirement villages is an ideal alternative-fuel vehicle application and effectively replaces a traditional gasoline vehicle for short trips.

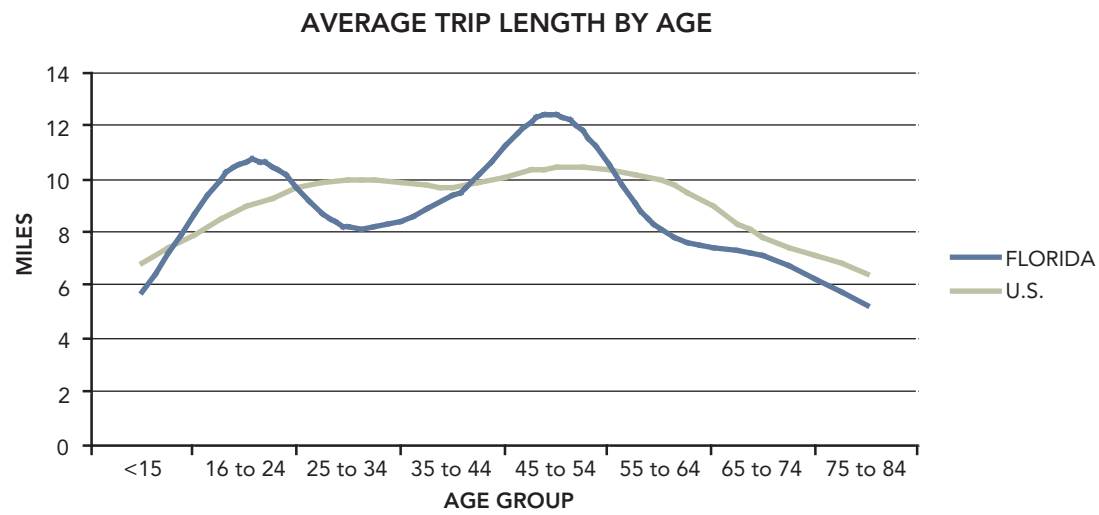
Additionally, data from the Nationwide Personal Transportation Survey (Figure 2) shows that trip lengths across certain age groups are shorter in Florida than the national average, most significantly in the 55-year plus bracket. Accordingly, Florida presents a strong market for manufacturers of vehicles with limited range.

C. Urban Densities

Urban densities are also a factor for consideration in alternative-fuel vehicle programs. Higher densities justify infrastructure investments, make servicing of markets less costly, and are typically concurrent with shorter trip lengths and higher levels of pollution. Many alternative-fuel vehicles, particularly the Neighborhood Electric Vehicles previously mentioned, are well suited to short trip lengths and generate fewer emissions than traditional petroleum-fuelled vehicles. Relatively, Florida ranks a close third behind New York and California for percentage of the population residing in metropolitan (urbanized) areas[4] (Figure 3).

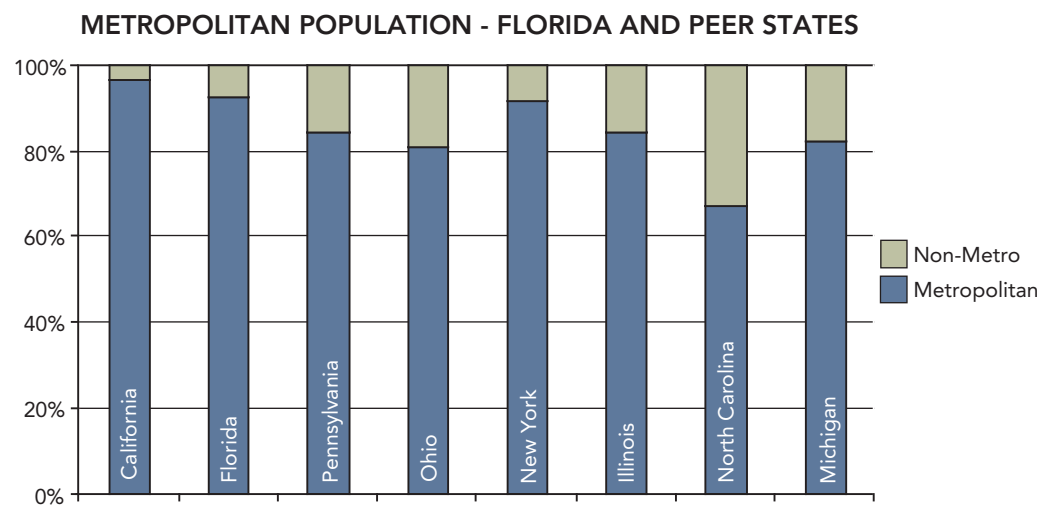
[4] US Census Bureau; http://eire.census.gov/popest/archives/metro/ma99-06.txt

Figure 2: Average Trip Length by Age



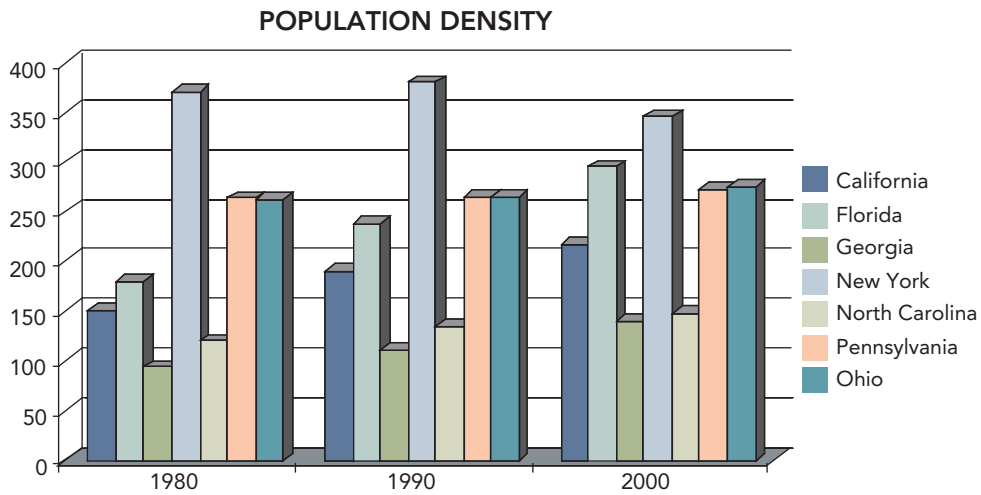
Source: Center for Urban Transportaion Research, U. of South Florida: based on 1995 Nationwide Personal Transportation Survey; Sample Size: 409,000 US, 10,399 Florida

Figure 3: Percent Metropolitan Populations



Source: US Census Bureau

Figure 4 – Comparative Population Densities



Source: U.S. Census Bureau, 2002

Florida's growth in housing units is also significant, increasing by over 1.2 million from 1990 to 2000[5], an overall rate of 19.7 percent, and an average rate of 1.81 percent per year. This is more than half a percentage point higher than the average growth for the United States during the same time period. Significantly, much of this growth occurred in urban areas. In 1990, 84.8 percent of Florida's population lived in urban areas. In 2000, Florida's population density was 296 persons per square mile, and is projected to grow to 470 persons per square mile by 2020[6]. This is roughly equivalent to current year densities in New York.

2. FLORIDA MOTOR VEHICLE FLEET COMPOSITION

There is little doubt that the need for high levels of personal mobility will continue well into the future. As such, strong demand for motor vehicles will continue, and the need to fuel them in a sustainable manner will become more critical. Since 1980 the number of registered motor vehicles in Florida increased by more than 67 percent. Florida's average growth rate of approximately 2.4 percent is much greater than any of the peer states, such as that of Pennsylvania at an average rate of 1.48 percent a year, New York at 1.43 percent per year, or Ohio at 1.58 percent (Appendix 3). Notably, the motor vehicle registration growth rate is almost identical in magnitude with the population growth rate. Following the projected growth trend in the population of the state, the number of motor vehicles registered in Florida each year is expected to grow at an approximate annual rate of 2 to 2.5 percent over the next 20 years, increasing from 12.7 million passenger cars and trucks in 2002 to over 15.5 million by 2022.

At these rates of growth, by 2022 Florida will have 15,567,356 (according to a linear trend method estimate) or 20,518,819 (according to an average growth rate estimate) registered cars and trucks (Refer Appendix 3).

A. Alternative-fuel vehicles

Alternative-fuel vehicles are already in use in numerous areas across the Florida in both the public and private sector, albeit in relatively few numbers. However the lessons learnt and applications identified as particularly suitable for alternative-fuel vehicles provide a sound basis for expanding their use in appropriate areas. Florida is a producer of the two main bio-fuels, ethanol and bio-diesel, and is a significant user of Hydrogen. Also, a topography, demography and climate particularly suited to electric vehicles place the State in a unique position to stake a leadership role in alternative-fuel vehicle deployment.

Although United States Department of Energy estimates indicate over 518,000[7] alternative-fuel vehicles are on the road in the United States today, they still represent only a small fraction of the total US fleet. This does not include the over 2.6 million[8] flex-fuel vehicles that can operate on blends of up to 85 percent ethanol fuel (E-85) that are in use throughout the country. In order to clearly understand the extent of alternative-fuel vehicle use in Florida, the Clean

[5] US Census Bureau 1990-2000

[6] Florida Statistical Abstract 2001. Prediction for 2020 is based on the medium estimate of the population for 2020

[7] EIA, 2002

[8] Estimates from Ford Motor Co, GM, and DaimlerChrysler for production 1999 - 2002

Fuel Florida Advisory Board, the Department of Community Affairs and the Florida Energy Office directed the Center for Urban Transportation Research at the University of South Florida (CUTR) to conduct an inventory of alternative-fuel vehicles and alternative fuel refueling sites in Florida.[9] The purpose of the survey was to determine the true level of alternative fuel activity in the State.

The survey, conducted in mid-2000, identified 5,725 alternative-fuel vehicles and 513 alternative-fuel vehicle refueling sites in Florida (Appendix 4). Florida's inventory of alternative-fuel vehicles comprises vehicles operating on compressed natural gas, liquefied natural gas, liquefied petroleum gas or propane, ethanol (E-85), methanol (M-85), bio-diesel, and electric-powered vehicles .

Immediately, a characteristic of alternative-fuel vehicles that affected widespread deployment of vehicles shone through; many alternative-fuel vehicles are equipped to operate on both an alternative fuel and a traditional petroleum fuel. These bi-fuel (operating on either of an alternative fuel *or* traditional petroleum fuel) or flex-fuel (operating on any *mix* of an alternative fuel or gasoline or traditional petroleum fuel) vehicles enabled purchasers to procure an alternative-fuel vehicle, although not necessarily operate it on an alternative fuel. The significance of this characteristic is twofold;

i) Typically, although a bi-fuel alternative-fuel vehicle is more expensive to purchase, it will meet federal procurement mandates such as the Energy Policy Act of 1992[10] discussed below. This places a large number of alternative-fuel vehicles on the road, yet does not create the demand for supporting infrastructure or fuel;

ii) Flex-fuel vehicles, such as E-85 cars and vans, are manufactured to meet federal mandates, yet are sold and operated in areas where the fuels are not available

The outcome has both positive and negative aspects. Mandated fleets expend greater capital costs in acquiring vehicles, yet the benefits of emission reductions and fuel displacement are not achieved. Accordingly, reported alternative-fuel vehicle activity falsely implies real market growth. However, given that the concentrations of alternative-fuel vehicles exist, it is easy to identify where infrastructure investments would have the best payoff. Furthermore, the considerable number of E-85 flex-fuel vehicles provides a significant market for bio-fuel suppliers.

Accordingly, the inventory counted only E-85 flex-fuel vehicles actually using E-85 as a fuel, and did not account for the estimated 98,000[11] E-85 flex-fuel vehicles on the roads at that time. By the end of 2002, it is estimated that over 200,000 E-85 vehicles such as Ford's Taurus, Chrysler's minivans and GM's small pick-ups are on the road in Florida.[12] Full detail of the inventory is available in the January 2001 Clean Fuel Florida Advisory Board report *Fueling Florida's Future* and in Appendix 4).

B. Federal Mandates - EPACT

The mandate that many of these vehicles were acquired under is known as EPACT, the Energy Policy Act of 1992 (Table 3).

Table 3 – EPACT Requirements

Year	Federal	State	AFP	Local Municipal
1997	25%	10%		
1998	50%	15%	30%	
1999	75%	25%	50%	
2000	75%	50%	70%	
2001	75%	75%	90%	
2002	75%	75%	90%	20%*
2003	75%	75%	90%	40%*
2004	75%	75%	90%	60%*
2005	75%	75%	90%	70%*
2006	75%	75%	90%	70%*

*Ruling yet to be ratified

In 1992, Congress passed Energy Policy Act, which was aimed at reducing the use of gasoline, diesel, and other petroleum fuels in transportation by encouraging the use of alternative fuels for cars and light trucks. However, the focus of this act was the acquisition of alternative-fuel vehicles, and not the consumption of an alternative fuel, the thought being that large concentrations of alternative-fuel vehicles owned and operated by government agencies would spur demand and prompt the development of supporting infrastructure. The Energy Policy Act mandates require that affected fleets purchase an annually increasing percentage of new vehicles as alternative fuel capable beginning in 1994. The percentages are

[9] Inventory of alternative fuel vehicle users and fuel providers conducted by the Center for Urban Transportation Research at the University of South Florida (CUTR) under the direction of the Clean Fuel Florida Advisory Board and the Florida Department of Community Affairs, June – October 2000. Details of inventory results provided in Appendix 4 of this report.

[10] The Energy Policy Act (EPAct) mandates that for some Federal and State agencies a certain percentage of annual fleet vehicle acquisitions be alternative fuel vehicles. More information on the EPAct program can be found on the website of the US Department of Energy: http://www.ott.doe.gov/epact/

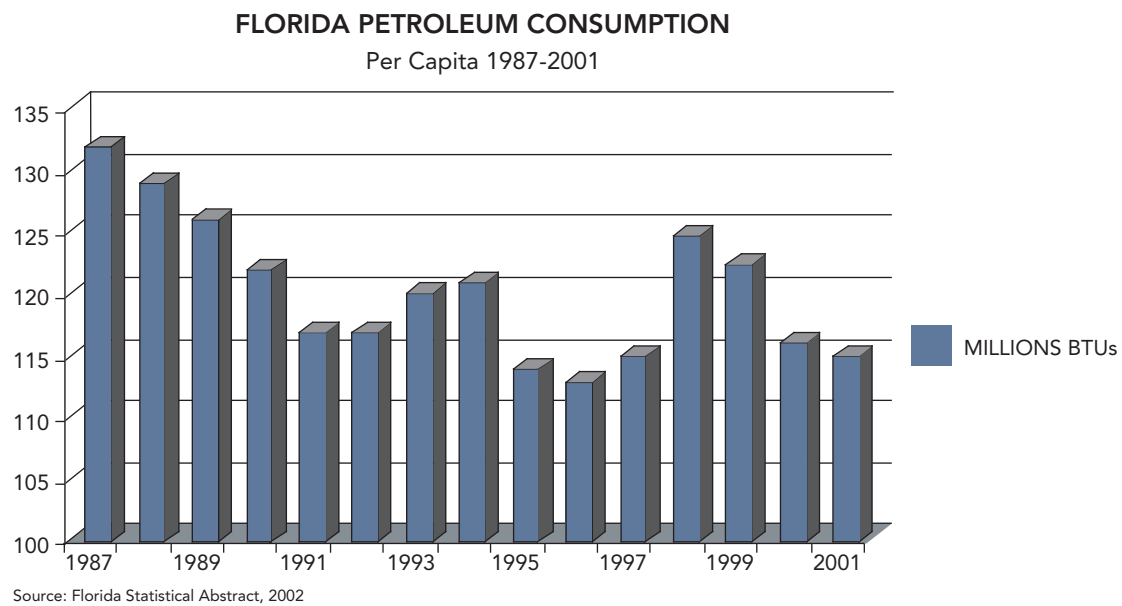
[11] Reports from Ford Motor Co, and DaimlerChrysler and the Center for Urban Transportation Research at the University of South Florida estimates 2000

[12] Center for Urban Transportation Research at the University of South Florida, 2002

capped, for federal and state fleets at 75 percent of certain vehicles in specified geographic areas, and at 90 percent of energy provider fleet vehicle acquisitions in certain areas after the year 2000.

Clearly, the Energy Policy Act mandates are not achieving their goal of widespread alternative fuel vehicle use, as was found in the early stages of the Center for Urban Transportation Research alternative-fuel vehicle inventory. The mandates have had little impact in Florida, as they apply only to metropolitan areas designated by the U.S. Environmental Protection Agency as having significant air quality problems, and only to fleets where a high concentration of vehicles are garaged at a central location. Other exemptions apply and, as a result, although fewer than 3,000 government operated alternative-fuel vehicles have been acquired over a seven-year period, the State is in full compliance with all Energy Policy Act requirements. Accordingly, in order to meet the original intent of the Act, that of reducing petroleum consumption and emissions, a program measuring fuel use would be more appropriate.

Figure 5 – Florida Petroleum Consumption per Capita



3. PETROLEUM DEMAND

To understand the nature of the transportation sector's demand for petroleum-based fuels, a number of factors such as the sectors' dependence on primarily one fuel type, total vehicle miles traveled, and vehicle efficiencies (fuel economy) must be considered. Motor fuel consumption in Florida exceeded 20 million gallons per day in 2001. At projected growth rates, daily consumption will exceed 28 million gallons by 2022[13]. By that time, the US dependence on foreign oil resources is projected to exceed 64 percent of annual consumption.

Indeed, Florida must be especially concerned, as it has experienced considerable growth in both population and affluence over the last 25 years, leading to above-average growth in motor vehicle ownership, vehicle miles traveled, and gasoline consumption. By the mid-1990s, southern states had among the highest rates of gasoline consumption in the nation. In 2000, median per-capita gasoline consumption in Florida (Figure 5) was almost 25 percent higher than the national average[14] (excluding California). Increased use of alternative fuels and alternative-fuel vehicles will both reduce the amount of petroleum that the US and Florida imports and mitigate the threat associated with disruptions in the oil supply.

A. Transportation Sector Dependence

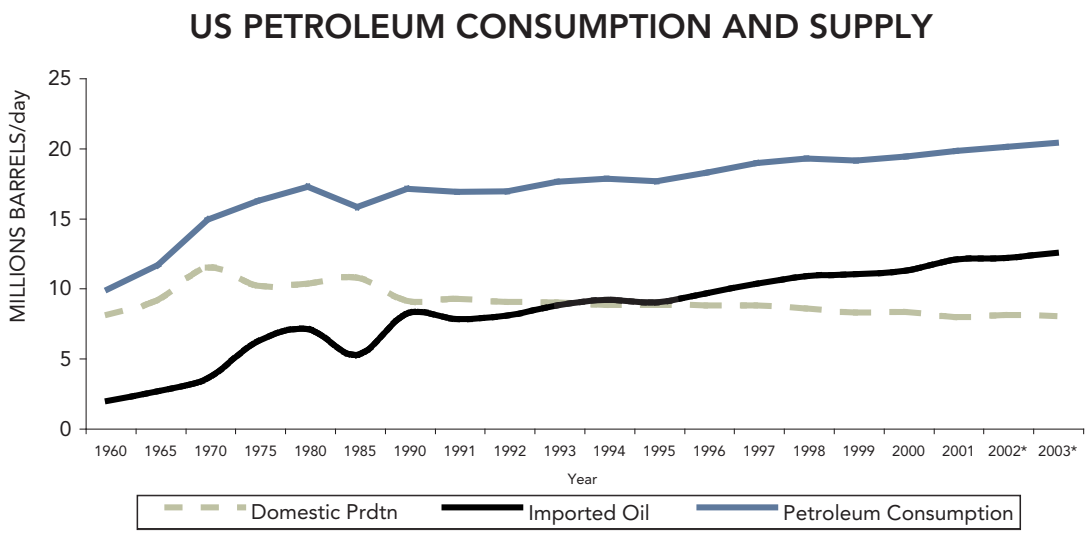
Florida and United States' dependence on gasoline as a transportation fuel source continues to grow while more and more of the oil is imported. Petroleum imports make up about one half of the US trade deficit and are estimated to account for up to 70 percent within the next 20 years,[15] imposing large penalties on the nation's economic growth and loss of

[13] Forecasts are based on the forecasting model of DOE, Annual Energy Outlook Forecasts for the South Atlantic Region. The module employed is based on three diverse scenarios that assume high, average, slow growth rates and oil prices respectively.

[14] Calculations are based on the data obtained from EIA 2002

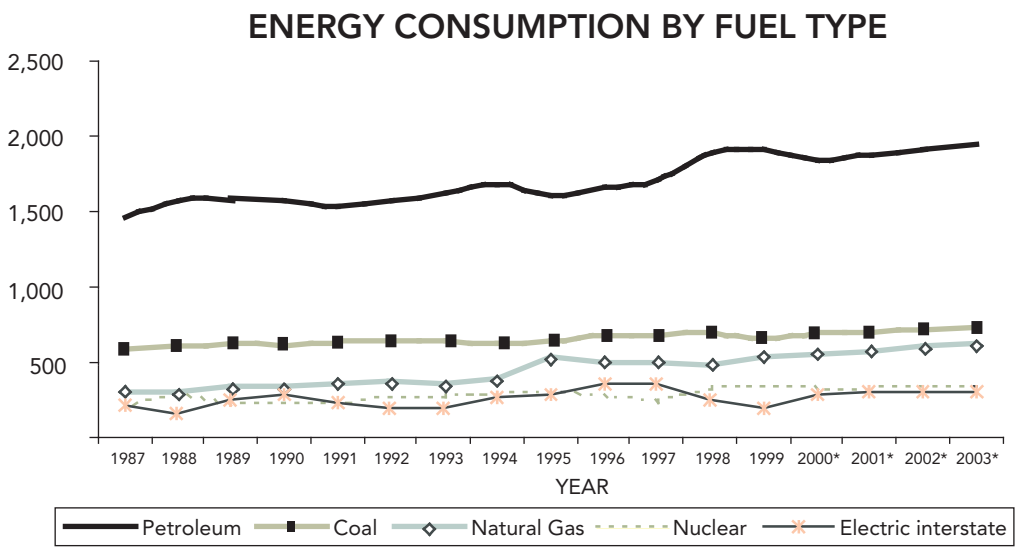
[15] Imports as share of petroleum consumption, EIA Annual Energy Outlook. http://www.eia.doe.gov/oiaf/results.html#tables. For major assumptions for the forecasts see: http://www.eia.doe.gov/oiaf/aeo/pdf/appg.pdf

Figure 6 – US Petroleum Consumption and Supply



Source: EIA 2002
* CUTR Estimate, 2002

Figure 7 – Florida Energy Consumption by Fuel Type



Source: EIA 2002

* CUTR Estimate, 2002

domestic jobs. Military spending for the 1990-91 Gulf War was estimated to exceed $61 billion.[16] Considerable debate is currently underway over how best to deal with the stronghold unstable governments have over significant Middle-Eastern oil reserves.

There is also considerable debate about the extent of petroleum reserves worldwide. Regardless, US reserves of petroleum are not matched by consumption patterns. According to the U.S. Energy Information Administration, imports exceeded domestic supplies of petroleum in 1993 (Figure 6) and have been growing as a percentage of our supply ever since.[17] When Florida is examined, petroleum is by far the leading source of energy consumed in our state[18] (Figure 7). Coal and natural gas are the next two most significant energy sources, primarily for electric power generation.

When Florida's energy uses are examined by sector, transportation use clearly leads residential, commercial and industrial uses[19] (Figure 8). Given the relative significance of transportation energy use, the State must look to find ways to preserve mobility and protect economic activity. The annual investment in Florida's highway system is over $5 billion and revenue generated from the trucking industry alone is around $6 billion per year.[20]

The annual growth rate in highway motor fuel consumption had slowed somewhat due to the higher

[16] BBC World News: http://news.bbc.co.uk/2/hi/business

[17] *U.S. Energy Information Administration State Energy Data Report*: http://www.eia.doe.gov/pub/state.data/pdf/FL.pdf

[18] *Florida Statistical Abstract*, 2000, Bureau of Economic and Business Research, Warrington College of Business Administration, University of Florida (BEBR) 2000.

[19] BEBR 2000.

[20] Bureau of Labor Statistics, *U.S. Industry and Trade Outlook, 2000*. Automotive Parts and Accessories; Tables 37-3, 37-7.

Figure 8 – Florida Energy Consumption by Sector

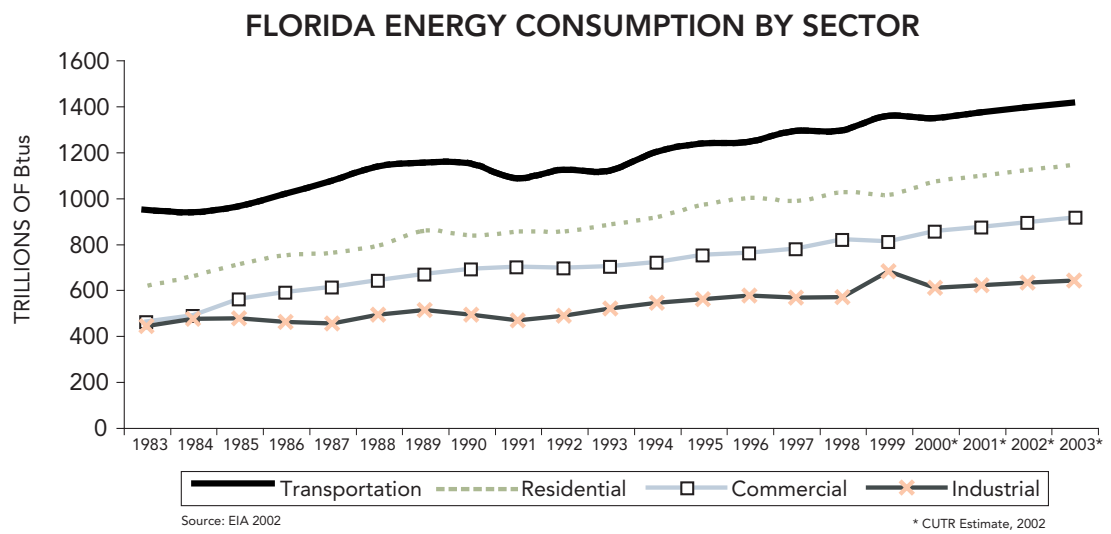


Table 4 – Florida and Peer States Energy Use

	FL	PA	OH	NY	IL	NC	MI
Total Energy Consumption (quadrillion Btu)	3.9	3.7	4.3	4.3	3.9	2.4	3.2
Per Capita Energy Consumption (million Btu)	255.0	310.0	384.0	235.0	320.0	320.0	328.0
Total Petroleum Consumption (million gallons per day)	39.7	28.9	28.3	34.3	28.8	20.2	23.8
Gasoline Consumption (million gallons per day)	19.9	13.5	13.9	15.4	13.7	11.2	13.9
Distillate Fuel Consumption (million gallons per day)	5.5	7.4	5.6	8.4	5.0	3.7	3.7
Liquefied Petroleum Gas Consumption (million gallons per day)	0.8	0.7	1.5	0.8	2.6	1.4	1.8
Jet Fuel Consumption (million gallons per day)	3.3	1.8	1.9	1.0	2.1	0.8	1.0

fuel efficiency of cars and light trucks. However, the increased proportion of light duty trucks commonly referred to as sport utility vehicles—or SUVs—has more than compensated for the fuel efficiency improvement. Both U.S. Energy Information Administration and the Environmental Protection Agency have pointed out that fuel consumption is not dropping in spite of improvements in fuel technology. Rather, manufacturers have used fuel efficiency improvements to support heavier and higher horsepower vehicles thus negating an overall gain in efficiency.[21] When considering the continued climb in vehicle miles traveled, rates of population growth, consumption and the strong growth in new vehicle sales (predominantly less economical light duty trucks) the prospects for reductions in overall consumption are bleak. At the projected annual growth rate of only 1.8 percent per annum, petroleum consumption will grow from over 20 million gallons daily[22] in 2000 to in excess of 28 million gallons (671,000 barrels) per day by 2020[23] (Figure 9).

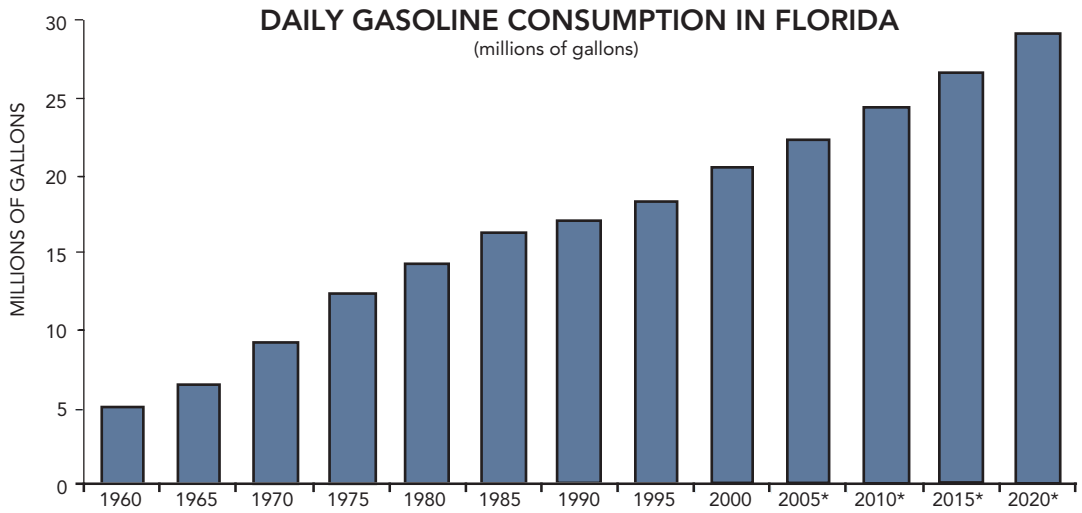
Compared to the peer states, Florida ranks highly in petroleum consumption, and quite significantly in jet fuel consumption (Table 4). Given the lack of alternative fuels for air travel, the need to preserve petroleum-based fuels and thereby protect the important tourism industry in Florida becomes even more relevant.

[21] U.S. Energy Information Administration (EIA), 2002

[22] EIA 2002 Figures for 2000 were obtained using a projected growth rate for the South Atlantic Region as per the forecast in the Energy Information Administration (EIA) Annual Energy Outlook 2002, and using the EIA State Energy Data Report, 1997, Table 71, as a base.

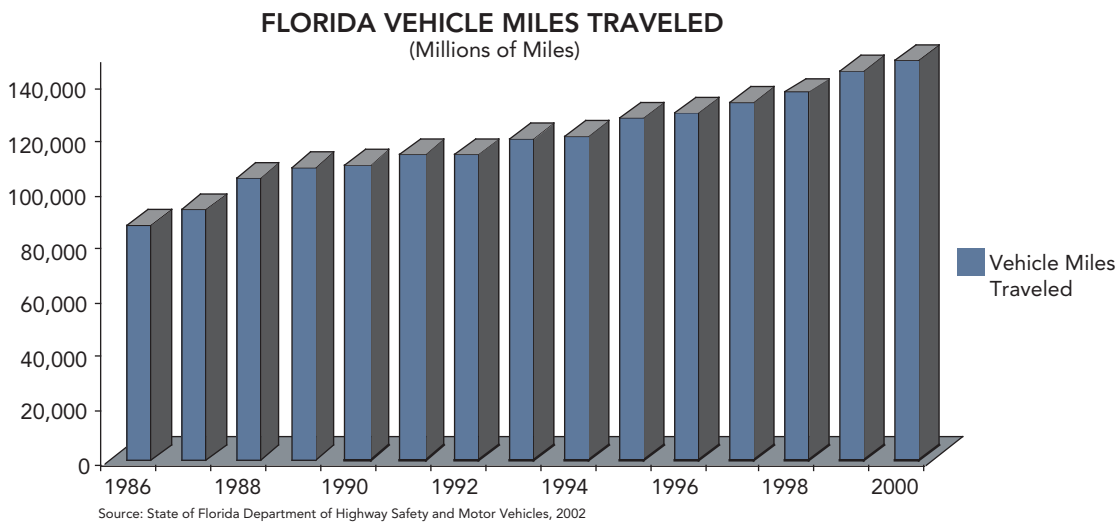
[23] EIA 2002

Figure 9 – Florida Daily Motor Fuel Consumption



Source: Energy Information Administration 2002 and CUTR estimates 2003
*Based on the EIA's projection of 1.8% annual growth

Figure 10 – Florida VMT 1986 – 2000



Source: State of Florida Department of Highway Safety and Motor Vehicles, 2002

B. Vehicle Miles Traveled

Vehicle miles traveled in Florida have increased 24.3 percent since 1990 (Figure 10). If this trend continues as expected, vehicle miles traveled will grow another 58.9 percent by 2020.

Compared to its peer states, Florida experienced the highest average growth rate in vehicle miles traveled over the last 20 years. Average annual growth of vehicle miles traveled in Florida was 3.55 percent; versus annual vehicle miles traveled growth in Pennsylvania of 2.00 percent, 2.48 percent in New York, and 2.17 percent in Ohio. If the current growth trend persists, total vehicle miles traveled in Florida will reach 226.9 billion by the year 2022 (based on a linear trend projection).

The message that continued growth in vehicle miles traveled provides is that solutions to mitigate petroleum demand must recognize the continued growth in demand for mobility. Unless alternatives to traditional gasoline and diesel vehicles provide at least the same levels of personal independent mobility, expectations for reductions in petroleum use and improvements in air quality will not be realized.

Public transit systems can play a significant role in addressing not just the mobility needs of the state, but also in reducing petroleum consumption and reducing emissions. States with the least transit service consume nearly three times as much motor fuel per household as do states in which rail transit predominates.[24] Transit ridership nationally has been increasing at a rate faster than that of vehicle miles traveled[25]. Most fixed rail transit systems operate on electric

[24] *World Almanac.* Newspaper Enterprise Association, New York, 1994

[25] US Department of Transportation, 2002 (http://www.dot.gov/PerfPlan2004/mobility_ridership.html) Transit ridership grew 5.0 percent in each of years 1999 and 2000, and by 4.3% in 2001. Growth is forecast at 3.5% for 2002

power, with significant benefits in air quality and energy use compared to individual passenger vehicles. More so, alternatively fueled transit buses are successfully in use in a number of areas in Florida (Appendix 4), either as battery electric, utilizing transitional fuels such as bio-diesel or emerging technologies such as hybrid electric systems.

C. Fuel Economy

Transportation's demand for energy, specifically petroleum-based fuels, is affected by a number of factors. First, although efficiency improvements have slowed the rate of growth in demand for fuel, fuel economy gains are projected to slow as a result of expected stable real fuel prices, the absence of new legislative mandates, and the increasing predominance of larger vehicles such as sport utility vehicles. Forecasts of increases in the demand for energy can be explained by the slowing in efficiency improvements, and projections are that efficiency levels for new cars, light trucks, and heavy trucks in 2020 will fall by 0.8, 0.9, and 0.6 miles per gallon, respectively relative to 2001 levels.[26]

Secondly, fuel economy improvements are unable to offset the effects of much faster growth in the total number of vehicles. The outcome is an increase in total fuel consumption as well as per capita fuel consumption. The wider availability of hybrid electric vehicles by manufacturers such as Honda, Toyota and others will impact overall consumption levels in future years[27], but not to any significant extent. Additionally, any motor vehicle efficiency improvements reduce the fuel costs of travel, which tend to increase the demand for travel, thereby offsetting some of the energy-saving benefits of the efficiency improvement and creating a "rebound effect".

Table 5 – US VMT and Fuel Use Patterns 1960 – 1998

	1960	1970	1980	1990	1998
Number of vehicles (thousands)	73,858	111,242	161,490	193,057	215,496
Vehicle Miles Traveled (millions)	719,000	1,110,000	1,527,000	2,144,000	2,625,000
Fuel consumed (million gallons)	57,880	92,329	114,960	130,755	154,884
Average miles per gallon	12.4	12.0	13.3	16.4	17.0
Average fuel consumed per vehicle (gallons)	787	830	712	677	719

Source: Bureau of Transportation Statistics http://www.bts.gov/itt/natf/Intro.pdf

Another key factor is the elasticity of vehicle travel with respect to fuel cost per mile. Past studies offer a wide range of estimates depending on the model formulation and time period, with some recent studies indicating that travel is insensitive to fuel costs and efficiency.[28] An analysis of light-duty vehicle miles traveled in the United States determined that the rebound effect has been quite small, about 5-15 percent, or less. The findings imply that the energy savings of technical fuel economy improvements to cars and light trucks will be (only slightly) reduced by increased vehicle travel. This also implies that gasoline taxes, or cost increases of fuel in total, would need to be very large in order to stimulate significant reduction in travel.

The effect of continued growth in vehicle ownership and demands for personal mobility are significant. Table 5 shows that since 1960 fuel economy (average miles traveled per gallon) has improved by 37 percent. However, growth in the number of vehicles has increased by 191 percent, and vehicle miles traveled have increased by 265 percent. Accordingly fuel consumption has increased by 167 percent.

4. ENVIRONMENT AND AIR QUALITY

Florida's attractiveness as a vacation destination stands threatened by the very growth it fosters and the tourist activity it consciously seeks. Combined with already significant growth levels of population, motor vehicles, vehicle miles traveled and energy demand, motor vehicle use (a mainstay of economic development for Florida and the nation), stands to harm not just the attractiveness of the State as a tourist destination, but also the health and well-being of the State's residents.

Over the past 25 years, the population of the United States has increased 28 percent,[29] vehicle miles

[26] EIA 2002

[27] CUTR analysis of Hybrid vehicle sales projections for Florida estimates a total hybrid vehicle availability of approximately 14,500 vehicles per annum by 2006.

[28] *Vehicle Use and Fuel Economy: How Big is the "Rebound" Effect?* by David L. Greene, Center for Transportation Analysis, Oak Ridge National Laboratory, TN, USA

traveled have increased 116 percent[30] and gross domestic product has increased 99 percent[31]. A negative effect of this growth is the impact on environmental quality and public health. Extensive data collected throughout the US have led to the recognition that a major contributor to our country's air quality problem is the exhaust from highway transportation vehicles. To address these problems, regulations and technology developments have targeted highway vehicles as specific pollutant sources. As a result of the enactment of a series of environmental laws and the introduction of new technologies, emissions per vehicle mile have been reduced by more than 90 percent since the 1960's[32]. However, due to the dramatic increase of vehicle miles traveled, transportation still remains a major contributor to US emissions of criteria pollutants.[33]

Criteria pollutants are those for which the U.S. Environmental Protection Agency has established standards to protect public health. There are six criteria pollutants: carbon monoxide, lead, nitrogen oxide, ozone, particulate matter and sulfur oxide. Additionally, nitrogen oxide and the volatile organic compounds react to form low-level ozone, a major component of smog in the presence of sunlight. These pollutants have numerous health and environmental impacts, including urban smog, and perhaps most worrisome, global climate change. Risks also exist in the transportation and storage of fuels, from shipping spills and container leaks.

The transportation sector is by far the largest consumer of petroleum fuels in Florida and the United States and accounts for about one-third of Carbon dioxide and nitrogen oxide emissions, 77 percent of carbon monoxide emissions, and more than one-third of volatile organic compounds[34]. Use of alternative fuels can reduce emissions of many of these pollutants. Propane and ethanol provide significant reductions in the emission of nitrogen oxide and volatile organic compounds. Compressed Natural Gas in place of diesel reduces nitrogen oxide, sulfur oxide and particulate matter, and electric vehicles reduce tailpipe emissions to zero (emissions of criteria pollutants are displaced to the point of power generation and are significantly more easily controlled). Blends of Bio-diesel with petro-diesel, typically in mixes of 20 percent bio-diesel with 80 percent petro-diesel, can achieve significant emission reductions. The use of bio-diesel in conventional diesel engines can reduce unburned hydrocarbons, carbon monoxide, and particulate matter compared to emissions from diesel fuel. In more pure mixes of bio-diesel, emissions of sulfur oxides and sulfates (major components of acid rain) can also be significantly reduced or eliminated.

Medical researchers have determined that high levels of carbon monoxide, which impedes the flow of oxygen in the body, can result in heart attacks, strokes, and death. Recent studies have documented an alarming increase in the level of carbon dioxide in the earth's atmosphere.[35] Sulfur-based pollutants irritate respiratory epithelium and aggravate asthma. Total suspended particulates causes inflammation of respiratory epithelium and can lead to death.[36] Ash soot and smoke also contain particulate matter that can damage and discolor buildings and other important structures. Nitrogen oxides can cause chronic obstructive pulmonary disease and decrease normal breathing capacity. Sulfur oxide and nitrogen oxide are two of the main ingredients in acid rain, which endangers ground water, trees, and lakes and can damage buildings. Estimates of the current cost of the United States' fuel-cycle emissions of greenhouse gases range from $3 billion to $27 billion.[37] Predictions of a 2.5 degree centigrade warming of the world by 2025 translate into damages of over $60 billion annually from agricultural losses, increased mortality, increased electrical use from air conditioners, and loss of water supply.[38]

Major reductions in the level of air pollution in Florida have been achieved through agreements between electric power providers, the Florida Department of Environmental Protection and the Federal Environmental Protection Agency.[39] Further gains are anticipated from motor vehicles through the in-

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[29] US Census Bureau, 2000

[30] Federal Highway Administration, 1999

[31] Bureau of Economic Analysis 1998

[32] US Environmental Protection Agency, 1999

[33] US Environmental Protection Agency, 2000

[34] Pacific Northwest Pollution Prevention Research Center, 1999

[35] Center for the Study of Carbon Dioxide and Global Change 2002 (http://www.co2science.org/edit/v3_edit/v3nl3edit.html)

[36] Health Effects Institute (http://www.pmra.org) in collaboration with the U.S. Environmental Protection Agency.

[37] Union of Concerned Scientists, 1996, estimates of annual cost.

[38] Union of Concerned Scientists, 1996

[39] An example of this was the agreement in 2000 between the Florida Environmental Protection agency and TECO

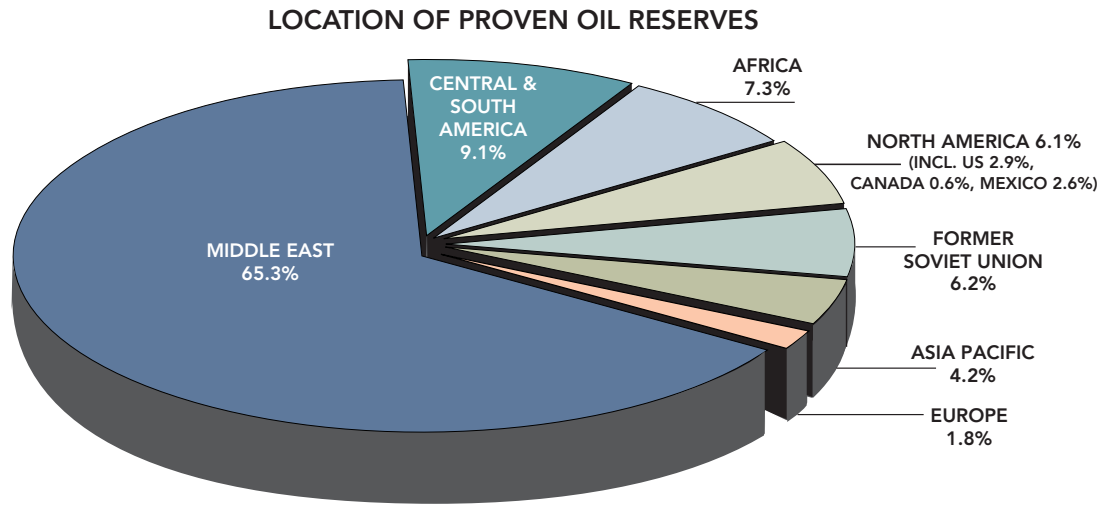
troduction of new technologies and cleaner burning fossil fuels. Nonetheless, the transportation sector is by far the largest energy consumer in the State. Assuming continued growth in the number of licensed motor vehicles, as well as continued growth in vehicle miles traveled, significant gains anticipated from new motor vehicle technologies will not be realized unless something is done to reduce aggregate demand for petroleum as a transportation fuel source. Many of the new motor vehicle powertrain technologies continue to use non-renewable petroleum as their primary fuel source.

In addition to the economic and environmental problems associated with petroleum combustion, an often-overlooked reason to reduce the large-scale burning of hydrocarbons is to preserve them for other important uses. Numerous medicines, plastics, clothing, and other consumer products are derived from petrochemicals. Fueling our transportation system with a non-petroleum-based alternative will have at least three beneficial effects. First, it will lessen or eliminate the need for imported oil, which will reduce the trade deficit. Secondly, it will reduce pollution if the right alternative fuels are selected. Lastly, reserves of a valuable and finite resource could be prolonged.

5. GEOPOLITICAL OUTLOOK

Florida can do its part in reducing the US dependence on imported petroleum. A secure source of energy means both a stable supply and a stable price. The US only holds approximately six percent of current known oil reserves (Figure 11), and is highly dependent upon foreign sources of oil. By 2020, the United States "will import nearly two of every three barrels of oil [it uses]— a condition of increased dependency on foreign powers that do not always have America's interests at heart"[40]. Overall, the US is one of the three greatest consumers of oil, next to Europe and Asia. Continuing strong economic growth in lesser-developed countries in Asia (and elsewhere) will impact the demand for oil from the world's suppliers. For both the US and Florida, a reduced dependence on imported oil can minimize the effects of oil price increases and protect the State from concerns over supply issues.

Figure 11: Location of Proven Oil Reserves



Source: BP Oil Statistical Review 2002

A. OPEC Dominance of Reserves

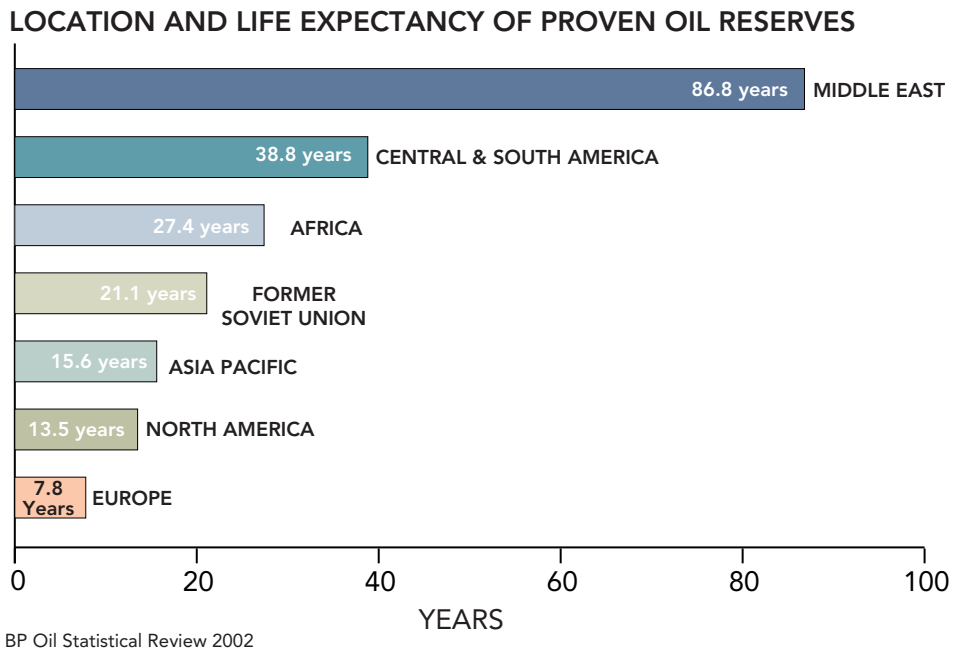
The world produces over 75 million barrels of crude oil a day; over 27 billion barrels a year. The United States consumes just over 19 million barrels of oil per day, almost 26 percent of the world's daily oil output. Out of 75 million barrels of oil produced daily, the Organization of Petroleum Exporting Countries (OPEC) produces 29.46 million barrels, or 39 percent, and OPEC's share of world oil production is expected to rise as other well fields are depleted

Among the non-OPEC countries the biggest crude oil producers are the United States, producing 8.09 million barrels of oil a day, and Russia at 6.22 million barrels a day. Other non-OPEC producers are Norway (3.48 million barrels/day), Mexico (3.33 million barrels/day), China (3.20 million barrels/day), United Kingdom (2.94 million barrels/day) and Canada (2.68 million barrels/day). BP Amoco[41] reports OPEC's "proved reserves" at 77.6 percent of the world total. OPEC production from 1985 to 1999 grew at an av-

[40] Union of Concerned Scientists, *Clean Energy Blueprint 2002.* (http://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=44

[41] BP statistical review of world energy 2002, (http://www.bp.com/centres/energy2002/index.asp)

Figure 12 – Location and Life Expectancy of Proven Oil Reserves



Source: BP Oil Statistical Review 2002

erage rate of 3.46 percent per year. In contrast, non-OPEC production grew at only 0.37 percent a year during the same period; effectively the OPEC nations' rate of oil production from 1985 to 1999 increased by 9.33 times that of the non-OPEC nations.

Historic world oil production data slowed from 1960 to 1999. The average rate of growth from 1960 to 1973 was 6.65 percent per year, however from 1973 to 1979 growth slowed to 1.49 percent per year, and from 1979 to 1999, it slowed yet further to 0.75 percent. Forecasts are that that total world oil production will reach an all-time peak in 2006. From 2006 to year 2040 world oil production is projected to fall by 58.8 percent, an average decline of 2.45 percent per year.

The OPEC/non-OPEC crossover event is predicted to occur in 2008. This event will divide the world into two camps: one with surplus oil, the other with none (Figure 12). The following scenario is predicted; (i) by 2008, the 11 OPEC nations will produce more than 50 percent of the world's oil, (ii) thereafter OPEC will control nearly 100 percent of the world's oil exports.[42]

B. Increasing demand from developing countries

The world consumption of more than 75 million barrels daily grows on average by more than 2 percent a year. The reason for this thirst for oil and other forms of energy is economic growth. As industrial production increases, industry itself needs more energy and also needs more fuel to transport products and raw materials. Businesses and offices need increasing amounts of energy to provide heat, lighting and air conditioning, transport goods and provide services. Economic growth also creates consumers who spend more on energy-hungry leisure activities, such as motoring.

As such economic growth depends on increased energy consumption. One positive aspect of developed countries energy use is a decline in the energy needed to maintain a healthy rate of growth in gross domestic product. According to one estimate, a growth rate of 5 percent in the 1970s was associated with a 7 percent increase in oil demand.[43] However, by the mid-1980s, this had decreased to 2 percent. In the rich countries, the relative decline of the manufacturing industry, which is energy intensive, in favor of the service sector has accentuated this trend. The situation is considerably different in developing countries. Manufacturing plays a key role in development for many, and increased levels of urbanization and car ownership have added to their demand for oil. According to the International Energy Agency, developing countries use more than twice as much oil to produce one unit of economic output as do developed countries. In the early 1970's, developing countries accounted for 26 percent of oil demand. Now their share is close to 40 percent and likely to continue growing, with the countries of South-East Asia and China being the most dominant.

[42] Richard C. Duncan, Ph.D., Geological Society of America, Summit 2000, Reno, Nevada

[43] BBC News, Internet edition, "The world's thirst for oil" by economics correspondent Andrew Walker. (http://news.bbc.co.uk/1/hi/world/686682.stm)

In the past decade China has experienced rapid economic growth, and generated a strong increase in demand for petroleum and other primary energy sources. Between 1990 and 1999, China's gross domestic product increased at a compound real annual rate of 10.4 percent, making China one of the fastest growing economies in the world. During the same period, petroleum consumption increased at a compound annual rate of 6.3 percent and China's oil production grew at a compound annual rate of 1.7 percent. Since 1996, China has been a net importer of oil.[44]

Strong demand for oil and petroleum is also expected from South Korea, which ranks fourth in petroleum imports, fifth in oil refining capacity and sixth in oil consumption. Korea's total demand last year was 201.3 million tons of oil equivalent, a year-on-year growth of 4.4 percent. Total energy demand is projected to reach 334.2 million tons of oil between in 2020, an average annual increase of 3.0 percent. Total primary energy consumption in December 2000 was 18,345 thousand tons of oil, up 2.7 percent from the year before. Petroleum consumption totaled 9.294 million tons of oil, up 2.5 percent and accounting for 50.7 percent of total consumption last December. Coal consumption totaled 3.716 million tons of oil, up 10.2 percent, and natural gas consumption came to 2.543 million tons of oil, an increase of 10.6 percent. Total energy imports in December 2000 increased by 5.1 percent, compared with December 1999, and is expected to continue to rise.[45]

Led by burgeoning demand in Asia, world energy demand will continue to grow strongly over the next 20 years. According to the International Energy Outlook 2002 released by the Energy Information Administration, by 2020 world energy demand will rise 60 percent over 1999 levels, reaching 612 quadrillion Btu.

The newly emerging Asian economies (including China and India, but excluding the developed countries of Australia, Japan, and New Zealand) contribute 42 percent of the projected increase in world energy consumption between 1999 and 2020. Industrial sector growth, which motivates Asia's strong economic performance, is a driving force. Developing Asia accounts for 48 percent of energy demand outside the industrialized world in 2020. Energy consumption in developing Asia will exceed the Unites States' consumption by 9 percent in 2005, and by 44 percent in 2015 when it will surpass consumption in all of North America.[46]

Increasing population and economic growth in China and India will more than double oil consumption in those countries over the next 20 years. India already imports almost two-thirds of its petroleum. Similarly, oil demand is expected to double in Central and South American countries by 2020, with Brazil accounting for over 40 percent of that growth. Although world oil supplies are projected to grow over the next two decades[47] it will be at a rate less than the growth in demand. Moreover, world motorization contributes significantly to oil demand. The total number of light-duty vehicles is forecasted to increase by a factor of 3 to 5 over the next fifty years, bringing the worldwide total to 2 to 3 billion.

These projections are subject to much uncertainty especially in China, where energy demand in the transportation sector may undergo considerable change. In the International Energy Outlook 2002 reference case, oil demand in developing Asia grows at an annual rate of 4 percent between 1997 and 2010; in China it increases by nearly 3.2 percent annually. If developments in China's transportation sector follow those already seen in Thailand and South Korea where double-digit growth rates in automobile ownership continued throughout the 1990s, the growth projected in the International Energy Outlook 2002 could be drastically underestimated.

The need to consider non-petroleum sourced alternative fuels is also driven by forecasts of significant increases in demand for crude oil by-products such as natural gas. Natural gas is the fastest growing primary energy source over the next 20 years (by more than 3 percent annually), gaining share relative to oil and coal. By 2015, gas demand should surpass coal consumption on a worldwide basis, as resource availability, cost, and environmental considerations all favor its use in industrial applications and electricity generation. Worldwide, natural gas consumption is estimated to reach nearly 145 trillion cubic feet by 2015 (85 percent more than in 1995), with the highest regional growth rates in developing countries. In developing Asia, gas demand has been increasing almost 8 percent annually.

World oil prices are forecast to reach $23 per barrel (in constant 1995 dollars) by 2020 in the International Energy Outlook 2002[48] reference case despite a 51-percent increase in projected oil demand. Relatively

[44] http://www.cnoocltd.com/front/html/company-about-6.html

[45] Alaska Department of Community and Economic Development, "Korea, quarterly energy report, 2001

[46] Energy Information Administration, International Energy Outlook 2002

[47] Energy Information Administration, International Energy Outlook 2002

stable long-term trends in oil prices are expected because of growing investment opportunities in resource rich producing areas, increased understanding of the world's oil resource base, and improved methods of oil recovery. As a result, large future oil supply increments should be available at relatively stable development and production costs. While oil prices at the end of 1996 were actually higher than those projected for 2020, it is generally believed that higher prices will not continue in the long-term, although short-term issues can often introduce high levels of volatility in energy markets.

CONCLUSIONS

A significant expansion of alternative fuel use in Florida will not occur without comprehensive, clear and decisive policy action by the state. Florida's air quality needs alone will not be compelling enough over next two decades to drive a broad based shift in technology and a corresponding shift in energy use. It is unlikely that fuel cells will be affordable enough in next two decades to significantly impact emissions and oil dependency.

Hence, such policy action needs to be pre-emptive, as the need for alternative energy sources will most likely be driven from a challenge to the regular supply of oil from predominantly foreign sources. When assessed from an economic viewpoint (balance of payments, costs to transport, costs to "maintain political stability", etc), the need for a higher level of domestically available, renewable energy production and a lower rate of consumption is evident. Greater deployment of alternative fuel vehicles and a higher level of alternative fuel use is a viable solution to addressing this need.

[48] EIA, International Energy Outlook 2002

Alternative Fuel Programs

CHAPTER 3

Alternative Fuel Programs

A key goal adopted by the Clean Fuel Florida Advisory Board in formulating policy recommendations was that of not "re-inventing the wheel". Accordingly, close attention was given to alternative-fuel vehicles activity in the identified peer states, as well as recognized leaders in alternative fuel vehicle deployment in the United States and overseas. Many of the individual factors that have made other programs successful and sustainable are present in Florida. Motivations have been to reduce mobile source pollution, reduce dependency on imported fuels, and, in some cases, to be at the forefront of developing new technologies. Overseas, broader national efforts have had considerable impact on fuel use, with motivators ranging from air quality concerns, to availability and economic issues.

The following review outlines alternative fuel vehicle activity in the six peer states identified by the cluster analysis (refer Appendix 2), and a review of a number of overseas national programs and public/private alternative fuel vehicle partnerships. Through these, the Clean Fuel Florida Advisory Board sought to identify and relate to Florida the successful program motivators, establish what approaches are successful and sustainable, determine to what extent standard practices have been established, and evaluate what opportunities for economic development, reduced dependence upon foreign oil and reductions in pollution exist for Florida. A review of successful ongoing alternative fuel vehicle programs in Florida is provided in Appendix 4.

The review commences with a discussion of the U.S. Department of Energy's State Energy Program, an existing funding opportunity for alternative fuel vehicle projects at a state level. Each of the six states identified as peers using the cluster analysis technique[1] have some form of alternative fuel vehicle related program in place, either as prompted by State Energy Program funds, or by other initiatives. Examining the peer states provides a useful yardstick to evaluate the relative effort and concern placed on the need to expand alternative fuel use within the United States.

STATE ENERGY PROGRAMS

The State Energy Program[2] was established in 1995 by the Federal Department of Energy to provide states the opportunity to apply for a variety of special projects funding. The program seeks to save energy, strengthen the economy, and realize a cleaner environment and a more secure future by helping states promote energy efficiency and use of renewable energy sources. The success of the State Energy Program depends directly on the ability of each state's energy office to implement creative and insightful solutions to energy-related problems. States compete for funding to implement activities relating to several program areas such as building energy

[1] Cluster analysis classifies a set of observations into two or more mutually exclusive unknown groups based on combinations of interval variables. The purpose of cluster analysis is to organize observations (in this case Florida and other states) into groups, where members of the groups share properties in common.

[2] State Energy Program Source: http://www.eren.doe.gov/buildings/state_energy/participate.html

codes and standards, alternative fuels, industrial efficiency, building efficiency, and renewable energy technologies. The Office of Energy Efficiency and Renewable Energy is directly responsible for funding the State Energy Program projects. Approximately $18.5 million was available for these projects in 2002.

Among the goals of the State Energy Program are the direct involvement of states in activities that will accelerate deployment of renewable energy technologies. The most relevant areas of the program to this report and the transportation energy needs of Florida fall under a subsection titled "Transportation Technologies: Clean Cities/Alternative Fuels".

The State Energy Programs aim is to support the development and utilization of alternative fuels, as well as other creative methods for improving energy efficiency in transportation. The program has provided funds through State Energy Offices in support of Clean Cities Coalition (a federal initiative[3]) Alternative fuel vehicle projects, such as the development of infrastructure, niche markets, and strategic alliances between the Federal, State and local government partners and private sector Clean Cities stakeholders.

The estimated funds available in 2002 for projects totaled $4.5 million for designated Clean Cities coalitions[4] across the nation in five categories:

- Acquisition of commercially-available alternative-fuel vehicles that maximize alternative fuel use, (with a specific mention of Alternative fuel vehicle school buses)
- Projects that promote the development of Alternative fuel vehicle platforms;
- Projects that promote Alternative fuel vehicle infrastructure development;
- Projects that promote Alternative fuel vehicle visibility with vehicle signage; and
- Projects that provide cost sharing toward the salary of a Clean Cities Coordinator.

Cost sharing requirements for the projects range from 33.3 percent to 50 percent of total project cost. Several of the peer states have been the beneficiaries of funds awarded under this program area. North Carolina encouraged drivers to practice simple energy-saving habits through its *You Have the Power* marketing campaign. The program highlighted that the value of easy, low-cost steps such as regular oil and filter changes, proper tire inflation, observing speed limits, sharing rides, and avoiding *Jack-rabbit* starts. North Carolina also teamed with its southern sister to increase awareness of alternative-fuel vehicles. The Electrical Vehicle Education Information Forum and Curriculum Development Project provided non-technical information sessions to the general public and demonstrated how their implementation is a viable option.

The Greater Philadelphia Clean Cities Program partnered with neighboring states programs to provide incentive rebates for the purchase of alternative-fuel vehicles as well as the implementation of improved alternative fuel infrastructure. The Philadelphia program has also prompted Alternative fuel vehicle shuttle operations at the Philadelphia International Airport, local hotels, and universities.

Ohio partnered with neighboring Kentucky and Indiana to install Alternative fuel vehicle infrastructure in the tri-State area. Each partner tailored its efforts to meet its unique needs, while implementing a regional refueling network including natural gas and E-85. Specifically, Ohio converted several government fleets (including the City of Cincinnati) to E-85 and assisted in installing three 10,000-gallon underground E-85 storage tanks. Additional infrastructure improvements have been sponsored in Illinois. Chicago, having the nation's largest density of fleet vehicles, constructed ten E-85 refueling sites through the help of The State Energy Program. The project received $250,000 in federal funds.

Florida has benefited from several State Energy Program awards. Two recent major projects, *Eastward Ho!* and the *South Miami Corridor Redevelopment Project* focused on optimizing land use and integrating mass transit and multi-modal transit. The projects considered the impact of population densities in the study area and designed transportation solutions to maximize energy efficiency in the system. The Gold Coast Clean Cities Coalition is developing a network Alternative fuel vehicle refueling stations and providing incentives to public and private organizations for converting fleets to alternative fuels. Results have included a fueling network growing from eight to 20 stations, and the deployment of over 1,100 natural gas or electric powered vehicles.

1. Pennsylvania

Pennsylvania has received close to $200,000 in State Energy Program funds since 1998. Among the peer states reviewed, the state has the most Metropolitan Statistical Areas[5] (MSAs) under Energy Policy Act of 1992, and had the ninth-highest total of

[3] US Department of Energy, Alternative fuels data center: http://www.afdc.doe.gov

[4] Pennsylvania Department of Environmental Protection: http://www.dep.state.pa.us/dep/depuate/pollprev/sep/SP-CleanCities.doc

[5] MSAs – Metropolitan Statistical Areas as defined by The Office of Management and Budget (OMB)

alternative-fuel vehicles reported for 2002 (15, 670[6]). Most recent U.S. Department of Energy data shows that there are 161 alternative fuel vehicle refueling sites in Pennsylvania.[7] In 1992, the Commonwealth of Pennsylvania began offering grants under the Alternative Fuels Incentive Grant program to stimulate the use of alternative fuels. The program's goals were to improve air quality and reduce the state's dependence on imported oil.

The Alternative Fuels Incentive Grant program receives between $3 million and $3.5 million annually form the State's general fund. No more than 10 percent of the funds may go to any one applicant each year, and no more than 15 percent of the funds may go to any one county. Projects funded through the Alternative Fuels Incentive Grant program include providing a share of the incremental cost of alternative-fuel vehicles, conversion of eligible gasoline vehicles to alternative fuels, and construction of the refueling or recharging facilities. Small business and private individuals may also apply for grants through the Alternative Fuels Incentive Grant program to install small "time-fill" compressed natural gas units on their property. Other agencies in Pennsylvania are also active in promoting alternative fuels. The differential cost of an electric vehicle is exempt from state sales tax, and the annual registration fee for electric vehicles and conversions is waived.

A number of private sector fuel providers and distributors are actively involved in assisting the deployment of alternative-fuel vehicles and providing supporting infrastructure. The Consolidated Natural Gas Company offers no-interest loans for conversions and refueling stations and may provide temporary refueling facilities. Equitable Gas has funded the acquisition of natural gas vehicles and refueling stations. Pennsylvania Gas and Water also provides financing and loan programs for alternative-fuel vehicles. Pennsylvania Power and Light Company offers a $.02/kWh credit on electricity used to recharge an Electric Vehicle, while the Philadelphia Electric Company provides a $.03/kWh recharge credit. Philadelphia Electric also offers financial incentives on a case-by-case basis for compressed natural gas conversions and purchases of alternative-fuel vehicles and refueling stations. Philadelphia Gas Works also offers rebates and other incentives on natural gas vehicles.

2. Ohio

Since 1995, Ohio has received seven grants totaling more than $370,000 from the State Energy Program. The projects included acquisition of new compressed natural gas vehicles for the City of Columbus and infrastructure development in Cuyahoga County. Among the highlights of alternative-fuel vehicle promotion in the state are a rebate of up to $600 per vehicle converted to compressed natural gas from Cincinnati Gas and Electric, financing for compressed natural gas stations as well as technical assistance form East Ohio Gas, and a 10 percent income tax credit for fuel containing 10 percent by volume of ethanol. In 1990, the Governor signed legislation directing fleets of three state agencies to use E-10, a blend of 10 percent ethanol with regular gasoline, whenever possible. Under the requirements of the Energy Policy Act of 1992, the Ohio Department of Transportation

[6] Energy Information Administration, US Department of Energy, data as of September 2002

[7] Alternative Fuels Data Center, US Department of Energy: http://www.afdc.doe.gov

has initiated a compressed natural gas pilot project in Cleveland involving 20 pick-up trucks.

Ohio is one of 16 states in the United States that currently provide some form of incentive for ethanol production, use, or sale. These incentives take the form of tax credits for different purposes, sales or excise tax exemptions, or direct producer payments. Since July 1, 1981, Ohio provided a tax credit for ethanol or methanol not produced from natural gas or petroleum. This restricts the credit to ethanol produced at a facility that is coal-fired or has a capacity of less than two million gallons per year from "wood, or the grain of a cereal grass." The tax credit reduction is based on a formula, which adjusts the credit inversely with the federal motor fuel tax exemption. This incentive was reduced to 10 cents per gallon through September 2000 and is capped at $15 million per year.

In December 2001 the Ohio State Senate unanimously passed Senate Bill 144 providing tax incentives for investors in ethanol-producing plants. The nonrefundable credit against income tax liability or the corporate franchise tax would be equal to 50 percent of the money invested in an ethanol-producing plant approved by the Ethanol Incentive Board (established by the bill) with a cap of $5,000.

Utility and private incentives are also available in Ohio. East Ohio Gas offers compressed natural gas station financing, construction management, temporary fueling facilities for up to two years, technical assistance, and vehicle conversion training. The natural gas refueling stations that East Ohio Gas uses for its fleet is accessible to the public. Beyond a certain threshold of vehicles, East Ohio Gas will build and operate a compressed natural gas refueling station at the customer's site. The National Ethanol Vehicle

Coalition is an ad hoc group created by the National Corn Growers Association and the Governor's Ethanol Coalition to establish a national program to promote the use of 85 percent ethanol fuel (E85) as an alternative fuel to enhance agricultural profitability and further national energy independence. Through a cooperative effort with the National Corn Growers Association and its state affiliates, the Governor's Ethanol Coalition, state energy offices, and the U.S. Department of Energy, the National Ethanol Vehicle Coalition provides forgivable loans for the installation of public E-85 fueling facilities.

3. New York

New York has received nine grants valued at almost $1.1 million through the State Energy Program. Funds received in 2002 will be used to install compressed natural gas infrastructure on Long Island, help create an E-85 fueling network for the New York State Energy Research and Development Authority, and provide financial assistance and technical information to encourage fleets to purchase alternative-fuel vehicles and install fueling or charging stations. Vehicles powered by natural gas, propane, and electricity, including certain hybrid-electric vehicles, are eligible under most of the programs that the New York State Energy Research and Development Authority offers. Incentives are also available to encourage use of bio-fuels such as ethanol and bio-diesel.

The recently passed Clean Water/Clean Air Bond Act is one of the largest environment bond programs ever sponsored by a state government. The act allocates $55 million in bond money for research into alternative transportation fuel projects, to be administered by the New York State Energy Research and Development Authority, and another $20 million to the Department of Environmental Conversation for air quality improvement — which may be assigned to fund clean-fuel bus projects.

A Clean-Fueled Bus Program provides funds to state and local transit agencies, municipalities, and schools for up to 100 percent of the incremental cost of new alternative-fuel buses and associated infrastructure. The emissions reduction potential of alternative-fuel buses is evaluated for project selection. Funds come from the Governor's Clean Water/Clean Air Bond Act. Twenty-five million has been awarded for 538 buses including compressed natural gas, battery electric, and diesel hybrid-electric technology.

The New York State Clean Cities Challenge awards funds to members of New York's Clean City organizations to acquire alternative-fuel vehicles and/or refueling infrastructure. Funds are awarded on a competitive basis, and can be used to cost-share up to 75 percent of the

proposed project, including incremental purchase costs of alternative-fuel vehicles, the cost of installing fueling and recharging equipment, and the incremental costs associated with bulk alternative fuel purchases or contracts to purchase alternative fuels such as E-85 or biodiesel. The New York State Alternative Fuel Vehicle Tax Incentive provides a tax credit equal to 50 percent of the

incremental cost of electric vehicles and 60 percent of the incremental cost of other alternative-fuel vehicles. For electric and alternative-fuel vehicles with gross weight ratings of 14,000 pounds or less, the maximum tax credit is $5,000. For all other vehicles the maximum tax credit is $10,000. In addition to the tax credit for alternative-fuel vehicles, New York State has a sales tax exemption for the incremental cost of alternative-fuel vehicles.

The New York City Private Fleet Alternative-Fuel/ Electric Vehicle Program assists private companies acquire alternative-fuel vehicles. Funds are awarded on a competitive basis for up to 40 percent of incremental cost of new light-duty natural gas or electric vehicles, and up to 70 percent of incremental cost for new or converted medium and heavy-duty natural gas, electric, or hybrid-electric vehicles.

New York City has also undertaken a widespread effort to introduce alternative-fuel vehicles into its transportation system. Local Law 6 law mandates that 80 percent of the new light-duty vehicles and 20 percent of newly purchased buses, must be powered by alternative fuels. Natural gas has been the fuel of choice so far.

Several other city agencies have implemented alternative fuel programs. The New York City Department of Transportation, which owns 1,100 buses operating mostly in the city's outer boroughs, is currently building one of the largest natural gas bus fleets in the world, with 348 buses on order for delivery starting this year. Meanwhile, the Metropolitan Transportation Authority, which owns most of the transit buses operating in Manhattan, is in the process of purchasing 500 alternative fuel buses powered by natural gas, or possibly, by a hybrid-electric engine.

New York City has also begun a program to convert a significant portion of its 12,000-vehicle taxicab fleet to alternative fuels. A major marketing effort by the city's Taxi and Limousine Commission and several private sector companies is attempting to convince taxi operators to take advantage of state and federal funds to switch to alternative fuels. The Commission is offering an added incentive: extending the life of alternative-fuel vehicles two years beyond the mandatory five-year retirement deadline that applies to gasoline-powered cabs. Over 2, 600 taxis are scheduled for replacement in 2002.

Other recent initiatives in New York City include the Department of Sanitation's purchase of several alternative-fuel vehicles; the testing of electric pickup trucks and an electric bus by the city; and private sector initiatives by companies, such as Brooklyn Union and United Parcel Service, aimed at converting hundreds of company vehicle fleets to natural gas. Additional incentives for alternative-fuel vehicles in New York State include:

- A loaner program for compressed natural gas refueling stations from Niagara Mohawk Power.
- Financial incentives offered on a case-by-case basis for natural-gas vehicle fleets from Brooklyn Union Gas.
- Adoption of the California Low Emission Vehicle program. Exempts the cost differential for electric vehicles and charging infrastructure from the retail sales tax.

4. Illinois

The State of Illinois has been awarded $425,000 through the State Energy Program since 1998. Several legislative items and state programs are in place to promote alternative fuels in the state. Among the alternative fuel laws and regulations are a two percent sales tax exemption for 10 percent ethanol blends (E-10) and a requirement that 75 percent of state owned passenger cars, light trucks, and vans must be operating on alternative fuels by the year 2000. The State offers a rebate of 80 percent of the conversion cost or 80 percent of the incremental cost of an Alternative fuel vehicle, up to $4,000 per vehicle. Illinois also offers a rebate for the purchase of 85 percent ethanol (E-85).

The Renewable Energy Resources Program fosters investment in and the development and use of renewable energy resources within the state of Illinois. This program is funded by the Renewable Energy Resources Trust Fund, the state's public benefits fund and administered by the Illinois Department of Commerce and Community Affairs. The Renewable Energy Resources Program distributes funds in the form of grants (for large systems) and rebates (for small systems). The Renewable Energy Resources Program address alter-

native power generation and the development of fuel cell technology. Grant funds may only be used for actual equipment and installation expenses. Eligible applicants include associations, individuals, private companies, public and private schools, colleges and universities, not-for-profit organizations and units of state and local government. Applications are accepted on an ongoing basis. Potential recipients for program funding must be located within the service area of an investor-owned or a municipal gas or electric utility or an electric cooperative that imposes the Renewable Energy Resources and Coal Technology Development Assistance Charge.

Illinois also sponsors ethanol production and blending incentives. Gasohol, defined for tax purposes as a "motor fuel containing at least ten percent alcohol" is taxed at the rate of four percent per gallon, or a two percent sales tax exemption. Several utilities and private concerns offer incentives for alternative fuel use and development in Illinois. Peoples Energy partnered with Nicor Inc. to offer Chicago-area fleet owners and operators Clean Fuel Services which include owning and maintaining natural gas fueling equipment; arranging for the purchase of natural gas conversion systems, arranging for the purchase or transportation of natural gas or both, engaging in the buying and selling of emission allowances, and providing sources for conversion system manufacturers, cylinder suppliers, installers, and coordinating the installation of systems. Nicor Inc. also provide economic analysis to compare natural gas to other fuels and will provide technical support, loan portable compressed natural gas fueling facilities for three to six months, and loan compressed natural gas vehicles on a demonstration project basis to give customers the opportunity to try natural gas as a vehicle fuel. The four compressed natural gas fueling systems that Nicor uses for its own fleet are available to customers by arrangement. Additionally, Nicor Inc. has joined a partnership to offer Clean Fuel Services to Chicago area fleet owners and operators.

5. North Carolina

North Carolina has not been a recipient of any significant State Energy Program funding, and has few if any alternative fuel projects underway. The only project reported over the last five years is for the Triangle Clean Cities Coalition Coordinator. The project provided funding for the coordinator for the Triangle Clean Cities Program. The coordinators duties include working with a variety of state agencies to implement a statewide corridor and strategy for increasing the numbers of, and the infrastructure for, alternative-fuel vehicles; to develop more public-private partnerships to increase stakeholder groups and coalition effectiveness; to assure that alternative fuels are considered in all transit decisions; and otherwise support the use and awareness of alternative-fuel vehicles. Without strong and clear direction and support of alternative fuel programs for the State Energy Office, little alternative fuel vehicle activity is present in North Carolina.

6. Michigan

Michigan provides a 10 percent tax credit for electric vehicles for vehicles purchased after June 30, 1993 and prior to January 1, 2005. The credit is based on the purchase price and can total up to $4,000. The tax credit will be phased out in later years; and is reduced by one-fourth in 2002, one-half in 2003, and three-fourths in 2004.

A tax deduction up to $2,000 per vehicle is allowed for clean-fuel vehicles that use ethanol, methanol, propane, electricity, or natural gas. The tax deduction is based on the differential cost of equipping the vehicle to use the alternative fuel. A $5,000 deduction is available for trucks and vans weighing between 10,000 and 26,000 lbs. A $50,000 deduction is available for trucks weighing more than 26,000 lbs or busses that can seat at least 20 passengers. The deductions are available for vehicles purchased after June 30, 1993 and before January 1, 2005. A tax deduction of up to $100,000 can be claimed for clean fuel refueling sites. The deduction is available on property placed into service after June 30, 1993 and prior to January 1, 2003.

7. The Carl Moyer Program

The California Environmental Protection Agency's Air Resources Board administers the Carl Moyer Clean Engine Incentive Program. Funds are distributed through local air districts. The incentive program is named for the late Dr. Carl Moyer, in recognition of his work in air quality. Incentives, in the form of grants for private companies or public agencies operating heavy-duty engines in California, cover an incremental portion of the cost of cleaner on-road, off-road, marine and locomotive engines.

The Governor of California's Budget allocated a one-time appropriation of $16 million dollars to fund the Carl Moyer program through the 2001/2002 fiscal year. Previously, $25 million in the Board's 1998-99 fiscal year budget, $19 million in the Board's 1999-2000 fiscal year budget, and $50 million in the board's 2000/2001 were allotted for Carl Moyer Program incentive grants, as a means to reduce emissions from heavy-duty diesel engines that emit high levels of nitrogen oxide with new clean-technology engines.

In the first year of the program, the Air Resources Board distributed $24.5 million in project funds among sixteen local air districts, yet the demand for

project funds was more than three times the available amount. Forty percent of those funds were used towards alternative fuel on-road projects, 25 percent towards marine vessel projects, 20 percent towards agricultural irrigation pumps, 10 percent towards forklifts, and the remaining five percent towards other diesel re-powers (mostly off-road equipment). Staff estimated that projects funded in the first year of the program would reduce nitrogen oxide emissions by about 4 tons per day, and PM emissions by about 100 lbs/day.

In 1999 the Legislature approved a one-time budget appropriation of $23 million to fund the Carl Moyer Program for fiscal year 1999/2000, the second year of the program. Of these funds, $19 million went to the Air Resources Board to fund engine projects, and $4 million went to the California Energy Commission to fund infrastructure and advanced technology development. The Air Resources Board has distributed over $18 million of these second year funds to 20 local air districts.

In October 1999, the Governor also signed AB 1571 formally establishing the framework for the Carl Moyer Program into the Health and Safety Code, Chapter 9. In accordance with that Health and Safety Code, section 44275, et. seq., the Air Resources Board developed and presented a report to the Governor, Legislature, and the Advisory Board on the Progress of Program Implementation. The Advisory Board, with the assistance of the Air Resources Board, the California Energy Commission, and the local air districts, also developed its own report (*The Carl Moyer Program Advisory Board Report*, March 31, 2000) with recommendations to the Governor and Legislature. The main recommendation of the Advisory Board was to continue the Carl Moyer Program through 2010 at a funding level of $100 million per year. Based on the Advisory Board Report and other considerations, the Governor and Legislature approved a one-time appropriation of $50 million ($45 million to the Air Resources Board for engine projects and $5 million to the California Energy Commission for infrastructure and advanced technology projects) to fund the Carl Moyer Program through a third year (fiscal year 2000/2001).

At an increased funding level, the Advisory Board and the Air Resources Board recognized it would be a challenge for local districts to meet the matching fund requirement. The Advisory Board recommended to the Governor and the Legislature in its March 2000 report, that for third year funds and beyond the districts' matching fund requirement be capped at a level equivalent to the first year funding level ($25 million). The Governor and the Legislature responded by modifying the Health and Safety Code to allow the Air Resources Board to modify districts' matching fund requirement, if necessary to benefit the program. The new district matching fund requirement reflects the Advisory Board's recommendations in The Carl Moyer Program Advisory Board Report dated March 31, 2000.

Moyer Program grants offset the incremental cost of purchasing cleaner engines. For example, a company may be able to buy a new truck for $100,000, which meets the state's minimum emission standards, or buy a lower-emission truck for $125,000. The offsetting cost ($25,000) is available through the Moyer Program in order to buy the lower-emission truck. This framework is used to determine grants for off-road and other equipment; and for retrofitting or re-powering existing engines.

8. Greening UF

Greening UF is a grassroots movement of students, faculty, and staff from a variety of administrative and academic units that was initiated in October 1997 at the University of Florida. The purpose of the movement is to increase environmental literacy on campus, examine current practices to reduce environmental impact and to create a culture of environmental stewardship." [8]

The program's vision centers around five points:

- A university culture with a core philosophy of environmental stewardship, sustainable development, and critical examination of all activities in light of their environmental impact.
- Environmentally knowledgeable faculty and staff
- Graduates with highly developed knowledge of the environment and natural systems and their contributions to human well-being

[8] Greening UF: http://www.sustainable.ufl.edu/GreenUF1/index.html

- Research that develops clean, resource efficient technologies with low environmental impacts
- A university with a small ecological footprint

There are three distinct phases in the *Greening UF* program:

1. **Greening the University Curriculum**. Include "environmental literacy and the principles of sustainable development into most courses of study.
2. **Greening the University Operations.** Incorporation of sustainability into its culture and operations
3. **Involve students and student organizations.** Key participants are Students for Environmental Action and Students for Sustainable Development. Others are also involved.

BIO-FUEL PRODUCTION

Florida is a producer of two alternative bio-fuels in common use today; ethanol and bio-diesel. Significantly, much of the production of these fuels is exported to either other states with significant Alternative fuel vehicle activity or to markets overseas.

Bio-diesel production in Florida

The bio-diesel production facility in Lakeland, Florida has a capacity of 850,000 to one million gallons per month, and an annual capacity expandable to almost 20 million gallons. At this rate of production, and given current input costs (November 2002), the firm is able to retail the fuel between $1.40 to$1,80 per gallon. Overall, the most significant costs associated with bio-diesel are associated with raw materials, not the production process. Virgin oils tend to be more expensive than yellow grease, and accordingly the latter is the preferred raw input. Obtaining yellow

grease at a cost of between $0.45 and $0.60 per gallon would achieve price parity with petro-diesel.[9]

The Lakeland producer is targeting school buses as a key market for bio-diesel. Because school districts are financially constrained (and obliged to select the lowest-cost suppliers), using bio-diesel for its benefits to air quality and performance is not enough. As an alternative approach, the producer is seeking to demonstrate that in the long run, a change to bio-diesel would cost less because of the high cost to replace onsite underground storage tanks and clean up spills. In addition, the question was raised about abandoning the underground storage tank in favor of an above ground storage tank.

Bio-diesel use in Europe

Bio-diesel use is commonplace and accepted in many European countries. Demand for diesel in passenger cars is much greater than in the United States, where diesel fuels are typically the domain of heavy-duty vehicles and some larger pick-up trucks. Some 35-40 percent of Europeans drive diesel passenger cars. In 1991, Germany, by far the largest user, consumed 200 million gallons of bio-diesel; ten times the maximum production capacity of the Lakeland, Florida facility. In 2001, Germany pumped 500 million gallons, and estimates for 2002 are in excess of 750 million gallons.

Most of the European Union's oil used in producing bio-diesel is processed from rapeseed, produced on about 1.5 million hectares (3.7 million acres), although some soybean oil is blended in as well. In a smaller way, Malaysia and Indonesia are also players in the bio-diesel market by using palm oil in their production. Under appropriate economic conditions, bio-diesel production could represent a significant absorbing potential for additional acreage resulting from accession of Central and Eastern European Countries to the European Union. Bio-diesel has been produced on an industrial scale in the Europen Union since 1992, largely in response to positive signals from the European Union institutions calling for reduction in fossil fuel use.

In 2001, some twenty plants produced around one million tons of bio-diesel across Austria, Belgium, France, Germany, Italy and Sweden. More than 500 million kilometers are driven annually using bio-diesel in the European Union. Most of fossil diesel fuel in France is mixed with bio-diesel today. No other biofuel has been used to such an extent. Specific legislation to promote and regulate the use of bio-diesel is in force in various countries (including Austria, France, Germany, Italy and Sweden).

European countries impose relatively high (compared to the United States) excise duties for fuels for transportation. For bio-diesel there are exemptions in some countries such as in Germany, France, Italy, Sweden, Austria and the Czech Republic. The European Union commission intends to develop a five-percent market share for bio-fuels up to the year 2005 and recommends time-limited exemptions or

[9] OceanAir Environmental, August 2002

reductions of taxes on bio-fuels to zero to ten percent of normal amounts for the first ten years, then to increase stepwise.

The European Commission published an action plan and two directive proposals in November 2001 to encourage increased use of bio-fuels in the transport sector. The objectives of the action plan and the directives are to:

- Help reduce the European Union's dependence on external oil supply.
- Meet the objective of substituting 20 percent of diesel and gasoline fuels by alternative fuels in the road transport sector by 2020
- Establish a minimum level of bio-fuels as a proportion of fuels sold from 2005, starting at twp percent and reaching 5.75 percent of fuels sold in 2010.

European Union estimates released in November 2001 showed production of bio-diesel is more expensive than petroleum-based diesel. Bio-diesel has a production cost of approximately Euro500 per 1,000 liters, compared with Euro200-250 per 1,000 liters for traditional petroleum-based diesel, inclusive of refinery costs.

Ethanol use in Europe

In Europe more than two billion liters of alcohol is produced annually, however, less than 55 million liters is used as fuel. European ethanol production is still much smaller than bio-diesel production, and in 2000, France, Spain and Sweden together produced a total of 191,000 tonnes.[10] France is the biggest European ethanol producer but does not use ethanol in its pure form, transforming the alcohol into fuel oxygen-

ate ETBE (ethyl-tertiary-butyl-ether) for blended use with regular gasoline. In spite of much discussion in the European Union about fuel ethanol, the market for fuel ethanol in Europe is still comparatively small, with France being a possible exception. France is the largest ethanol producer within the European Union and three to fifteen percent of organic oxygenated compounds with gasoline is allowed. Although major improvements in technology over the past decade have helped ethanol to narrow the gap in price with fossil fuels, legislative and or financial support such as tax concessions are still required to achieve price parity. The Eurpoean Union is planning to mandate the use of ethanol in diesel by 2005.

The oil-price shock of the 1970's sparked interest in ethanol, which can be made from any agricultural crop containing sugar, starch or even cellulose. In Europe, ethanol is commonly produced from wheat and sugar beets. In France, a major producer of ethanol, there are seven beet-ethanol distilleries, 16 integrated sugar and alcohol complexes as well as a large synthetic ethanol production factory.

The primary driving forces causing the differences in bio-fuels usage between countries appear to be the national policies of those countries. Over the past few decades, market prices of bio-fuels, either ethanol or bio-diesel, have been higher than the market price of petroleum-derived equivalents. It is therefore not surprising that bio-fuels have had significant impact only in those countries where policies or incentives have provided a means for bio-fuels to compete economically. The European Union directive discussed previously with reference to bio-diesel use in Europe will be a catalyst for greater ethanol demand.

CONCLUSIONS

This review of federal and state programs in the United States, local fuel producers and international programs provides much of the direction for the Clean Fuel Florida Advisory Board recommendations at the close of this report. Furthermore, the recommendations provided by the Clean Fuel Florida Advisory Board are but a few of the many ideas, concepts and practices that could be effectively adopted by Florida to reduce foreign oil dependence, improve air quality, and promote economic development. As such, continued monitoring of these and other programs is worthwhile as a catalyst in expanding alternative fuel use in Florida.

[10] Platts Energy Information Provider: http://www.platts.com/features/biofuels/europe.shtml

Economic Issues and Opportunities

CHAPTER 4

Economic Issues and Opportunities

An efficient, dependable and sustainable transportation system facilitating personal mobility and efficient movement of goods is an essential element of a strong, vibrant economy. The dependence of the transportation system in Florida, and the United States, on primarily petroleum-based fuels should be a concern to policymakers and planners. Diversifying the fuel supply through increased use of alternative fuels and the expanded deployment of alternative-fuel vehicles makes good business sense and will further benefit the state through preserving environmental health and providing economic development opportunities.

While there are several factors that drive the importance of alternative-fuel vehicles, two are particularly significant—the economy and the environment. Economic factors revolve around energy security (the need for an uninterrupted, plentiful and affordable energy source necessary to fuel a robust economy), the need to position the state to take advantage of emerging technologies, and the need to ensure continued growth in the living standards. Environmental factors include the numerous health and environmental effects of petroleum consumption such as urban smog and greenhouse gases. This section will present detail on the potential benefits of expanded alternative-fuel vehicle use with regards to environmental benefits, oil displacement and local production of fuels. The relevance of these issues to the mission of the Florida Energy Office and the Florida Department of Community Affairs, as well as other state departments such as The Florida Department of Environmental Protection, The Department of Management Services and the Florida Department of Transportation will be discussed.

1. ECONOMIC ISSUES

Florida's and the United States' dependence on gasoline as a transportation fuel source continues to grow while more and more of the oil used for transportation comes from foreign sources. Significantly, petroleum imports make up almost half of the US trade deficit and are estimated to account for up to 70 percent within the next 20 years.[1] According to the U.S. Energy Information Administration, imports exceeded domestic supplies of petroleum in 1993 and have been growing as a percentage of our supply ever since.[2] Of additional concern is the significant military spending to protect the United States' interests in the Gulf region, where near term political stability is not assured.

Diversifying the supply of fuels used for transportation and identifying alternative-fuel vehicle receptive niche markets makes good business sense and has the potential to position Florida as a national leader in new technologies and transportation alternatives. Currently, almost half of the cost per gallon of fuel purchased by Florida consumers goes to crude oil producers[3] (Figure 13). At the least these revenues leave the state, and on the whole they leave the country. Developing a viable market for alternative fuels will not affect the economic viability of refiners, marketers or distributors, and can provide investment opportunities for in-state production of transportation fuels.

2. ECONOMIC OPPORTUNITIES

Fuel Production

Three alternative fuel types, albeit in low quantities, are already produced in Florida[4]. Ethanol is produced in Bartow[5], bio-diesel is produced in Lakeland[6], and

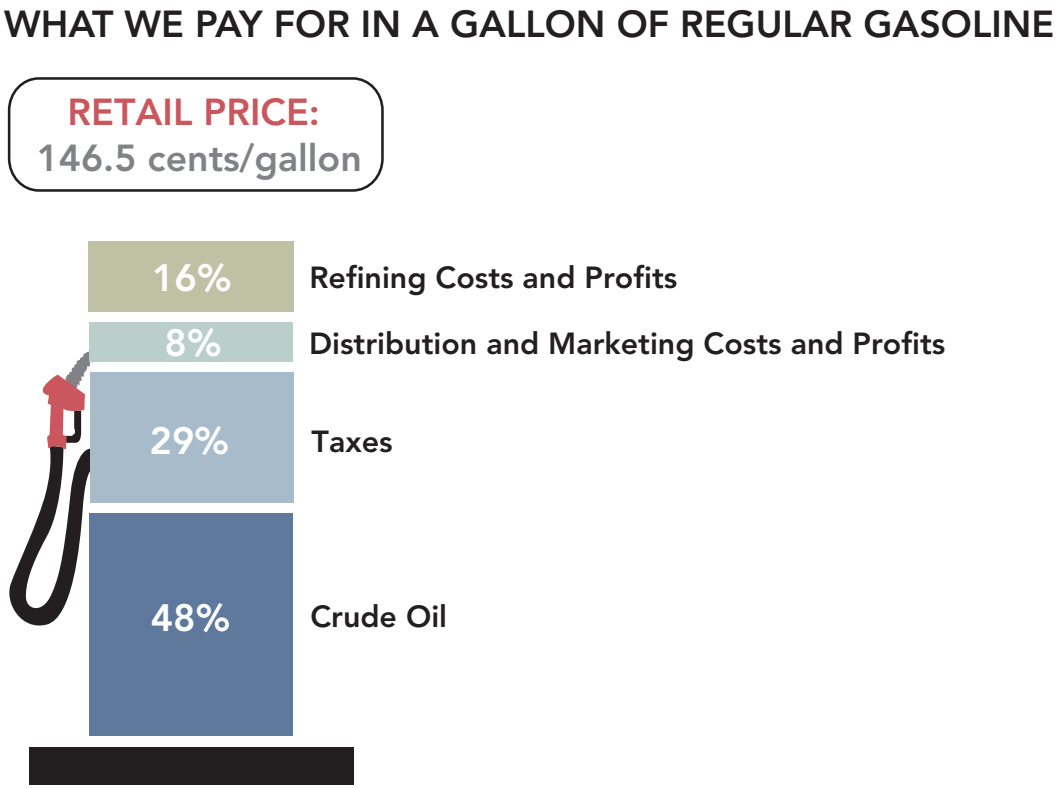
[1] Imports as share of petroleum consumption, EIA Annual Energy Outlook. http://www.eia.doe.gov/oiaf/aeo/results.html#tables
For major assumptions for the forecasts refer: http://www.eia.doe.gov/oiaf/aeo/pdf/appg.pdf

[2] Energy Information Administration, Annual Report 1999

[3] Energy Information Administration, August 2000

[4] Renewable Fuels Association, 2002

Figure 13: What We Pay For in a Gallon of Regular Gasoline



Source: Energy Information Administration 2001

hydrogen in Pace.[7] E-85 and Bio-diesel can be used in certain vehicles without the need for either engine modification or extensive infrastructure investment. In the quest for increased fuel efficiencies and lower emission, many auto manufacturers are now developing hydrogen-fueled cars, either as direct hydrogen combustion engines, or for use in fuel cells for electric power generation.[8] Each of these fuels, plus existing propane and compressed natural gas suppliers and electric energy providers, have a substantial market potential for their product in Florida.

An example of this is the bio-diesel facility in Lakeland, which has a production capacity expandable from 10 to 20 million gallons annually. All diesel vehicles can run on bio-diesel, with little if any modification[9]. For significant reductions of criteria pollutants, a B-20 blend (20 percent bio-diesel, 80 percent petro-diesel) is commonly used. A potential market for bio-diesel may be the Florida school system. Florida has the fifth largest school bus fleet in the nation[10], carrying over one million school children daily.[11] Operating this fleet on B-20 bio-diesel would displace 240,000 gallons of petro-diesel annually, achieve an estimated 10-ton reduction in hydrocarbon emissions and provide a $1.5 million market for bio-diesel producers in the state.

Transit fleets in general are particularly well suited to the use of alternative fuels and the application of advanced technology drivetrains. Apart from mitigating congestion, pollution and fuel use through reducing personal vehicle use, proven and widely available drivetrains are available for transit fleets that can achieve even greater reductions in petroleum use. Diesel engined vehicles can be operated on blends of bio-diesel with little if any modification. Battery Electric transit vehicles are in regular use in a num-

[5] Parallel Products. http://www.parallelproducts.com
3500 Highway 555, Bartow FL 33830, John Roth, Operations Manager
(941) 533-9388. Planned production 2002 and thereafter 6m gallons.

[6] OceanAir Environmental P.O. Box 2862 Lakeland, FL 33806. Jim Davis, (941) 683-7199. Florida production capacity 15m gallons/yr.

[7] Air Products and Chemicals Inc, Pace FL. Venki Raman, Production Manager. Production capacity of 32 tons /day of liquid hydrogen.

[8] BMW, Daimler-Chrysler, Ford, General Motors, Honda and Toyota are each developing either Hydrogen fuel cell vehicles or Hydrogen combustion vehicles.

[9] National Biodiesel Board http://www.biodiesel.org

[10] Based on 1999-2000 school year

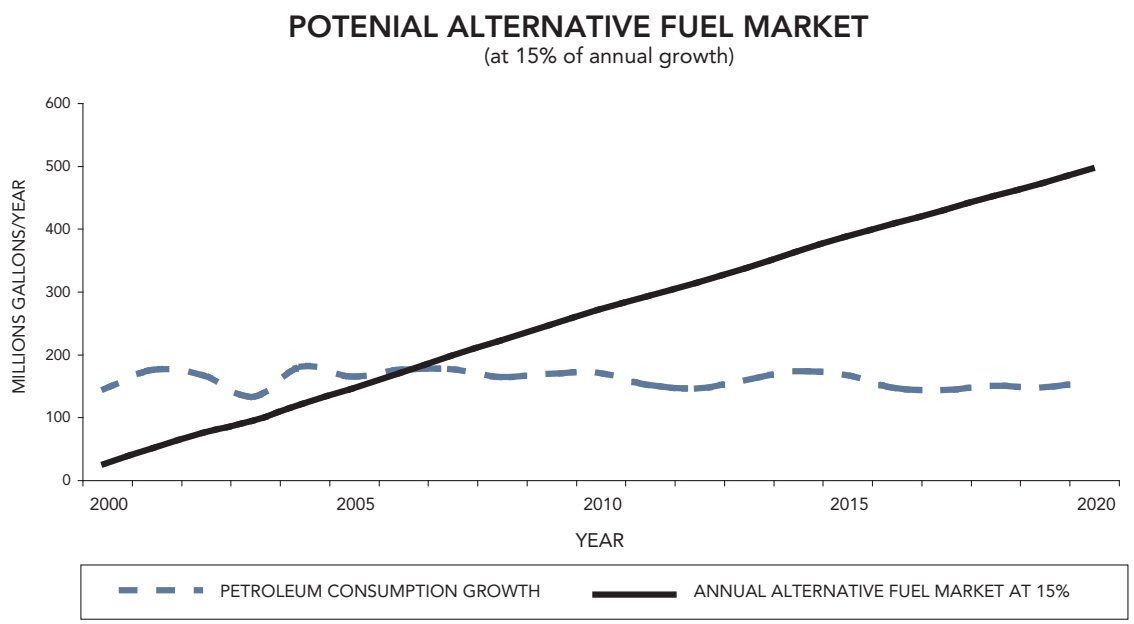
[11] School Bus Fleet Magazine, Internet edition: http://www.schoolbusfleet.com

ber of south Florida communities such as Miami and Fort Lauderdale and hybrid electric vehicles are being introduced in a number of transit and airport shuttle fleets (Appendix 4) across the State. Investments in the development of hybrid electric drivetrains for water taxi services has resulted in the deployment of a "clean transit" network of transit buses and water taxis in south Florida, with potential for national and overseas sale of vehicles.

A possible approach to demonstrate potential market size for fuel providers is to consider as a target replacing a proportion of total fuel consumption with that of an alternative fuel. Florida's annual consumption of (motor) gasoline alone exceeded 7.5 billion gallons in 2000[12], and is projected to grow at an annual average rate of 1.8 percent between 2000 and 2020,[13] an increase of approximately 156 million gallons per year.[14] Setting as a goal just 15 percent of the incremental growth in fuel consumed, alternative fuel providers could consider an annual market for over 500 million gallons of fuel annually by 2020[15] (Figure 14). At the projected fuel economies of new vehicles over the same period, this would equate to over 12 billion miles annually for which vehicles would be operated on an alternative fuel. Using a petroleum per gallon cost of $1.50, these 500 million gallons and 12 billion miles are valued in excess of $750 million in revenues.[16]

Presenting such scenarios as goals, targets or potential markets to fuel providers would assist in the identification and development of sustainable alternative fuel markets for Florida businesses, and the development of new industry for the state. E-85 and bio-diesel producers in Florida currently have a combined annual production capacity of approximately 30 million gallons. Companies within Florida

Figure 14: Potential Alternative Fuel Market



Source: U.S. Dept. of Energy, AEO, forcasts for the South Atlantic Region CUTR 2002

[12] Florida Motor Gasoline and Diesel Fuel Report, May 2001

[13] Energy Information Administration Prediction, 2000, based on the historic growth in the last 40 years

[14] Energy Information Administration, U.S. Department of Energy, 2002.

[15] CUTR Prediction 2000, based on the historic data obtained from US DOE

[16] CUTR 2002. 500 gallons @ $1.50/gallon gasoline equivalent = $750m At average consumption rates of US Fleet (23.4mpg) in 1999, this would equate to over 12bn miles for which vehicles would be operated using an alternative fuel.

have the knowledge and proven expertise to produce hydrogen on a commercial basis. The recent federal focus on hydrogen as a transportation fuel of the future presents significant opportunity for Florida to be an energy producer. In addressing the business potential of a 15 percent displacement of incremental petroleum use, each business would have a different focus. Electric vehicle manufacturers and hydrogen producers could target vehicle miles traveled; other fuel producers could target annual fuel production. In either scenario, neither firm is looking to displace existing traditional fuel use in the early phases of market development, only the displacement of a small percentage of the incremental growth in petroleum use.

As a state with little heavy industry and yet considerable agricultural activity, expanded alternative fuel use and production in the state can provide other business opportunities. With over 10 million acres of farm acreage[17], the state has the potential to diversify farming activities and become a major producer of alternative fuel feedstock. Energy experts see the use of bio-engineered crops for fuels as one of the major economic innovations occurring in the next ten years. New genetic technologies that permit the cultivation of crops to produce fuels such as ethanol will allow regions to essentially grow fuel and reduce dependence on imported oil.

Vehicle Markets

Florida is the fourth most populous state in the United States[18]. With a population over 16 million, 11.8 million licensed drivers, and 10.8 million licensed motor vehicles and light trucks[19], Florida's demand for motor vehicles and fuels is enormous. At current population growth rates, Florida adds an average of 100,000 households per year, creating an additional demand for new motor vehicles of almost 200,000 vehicles per year.

Growth in the Florida alternative-fuel vehicle market initially revolved around fleet use, and the Energy Policy Act of 1992 mandated government and energy provider operators. Under the Act, Federal, state, municipal, fuel provider and private fleets are currently mandated by the U.S. Environmental Protection Agency's Clean Fuel Fleet Program as part of the Clean Air Act Amendments to ensure a certain percentage of new vehicle acquisitions be Clean Fuel Vehicles. However, the Energy Policy Act of 1992 mandates only address new vehicle acquisitions, not conversion of older vehicles. Additionally, given the exemptions provided by the Act, past experience has shown the impetus or critical mass for a sustainable alternative fuel market will not be achieved through only public sector vehicle acquisitions. Accordingly, future growth in the alternative fuel market must be derived concurrently from the expanded deployment of alternative-fuel vehicles in public sector fleets as well as increased use in the private sector.

Opportunities for electric vehicles, with zero tailpipe emissions, abound in Florida. Commercially available low speed electric vehicles have numerous applications for landscape/nursery uses, ground sup-

[17] Florida Agricultural Statistics Service, 2000

[18] US Census Bureau, 2000

[19] BEBR 2002

port equipment, law enforcement, code enforcement, and security applications. Advanced, proven technologies are now available for marine applications such as Water Taxis, pleasure boating and other intercoastal marine applications. Appendix 4 details the successful development of electric and hybrid electric marine vessels for commercial transit use in Florida.

Numerous communities exist throughout Florida, serving both senior citizens and tourists, which lend them perfectly to electric or neighborhood vehicles. The travel patterns of senior adult community residents and visitors to tourist resorts match well with the short-range characteristics of electric vehicle technology. Many retirement communities feature convenient shopping, banking and recreational facilities, making it less necessary for residents to leave their neighborhoods. According to the Commission for the Transportation Disadvantaged, home-based community services have become the choice of senior and disabled consumers[20], driving demand for short-range low cost mobility options.

Additionally, many family neighborhoods today are master-planned communities where a homebuilder designs and builds the neighborhood. Most of these neighborhoods encompass schools, shopping centers, parks and playgrounds, and other conveniences that allow families to reduce their travel time outside the area. The potential market for Battery-electric vehicles is significant. Florida possesses a number of qualities essential particularly suitable to low-speed, short-range vehicles such as a typically flat topography, a relatively warm climate and the prevalence of two-car households with one of the vehicles being for short distance use. Shorter trip lengths associated with an aging population are all elements that point to a strong market for these vehicles in the state.

The potential for low speed, a short-range electric vehicle to become a key element of these communities is substantial. The emission benefits of EVs are considerable for short, low-speed trips. The U. S. Environmental Protection Agency's emissions standards for gasoline-fueled vehicles primarily address pollutants that are emitted while a car is warmed up and running. They do not address the warm-up, or "cold-start," period, during which time today's cars and small trucks produce significantly high levels of emissions for a given driving cycle. The reason for such relatively high emissions during the cold-start period is due to current-technology catalytic converters that don't start to function at full efficiency until they reach a temperature of about 300°C (572°F). To attain this temperature typically takes about two minutes of operation running at constant speed. During those two minutes, the vehicle produces 60 to 80 percent higher levels of pollutants than when warm.

Continued efforts to encourage "neo-classical" development and shortening many trip lengths, are one of the most beneficial actions that can be taken towards encouraging alternative-fuel vehicle use. Furthermore, the ability to recharge electric vehicles in off-peak periods provides better utilization of generating capacity, a benefit for the states' energy providers and electric ratepayers.

A market sector already exists for E-85 (ethanol/gasoline blend) in Florida. New flex-fuel E-85 vehicles are manufactured and sold by the major automakers such as Ford, GM, and DaimlerChrysler. The Florida Department of Transportation has taken the lead in procuring and using E-85 in their pool vehicles, with at least one District Office in the State both acquiring exclusively E-85 vehicles for all fleet needs for the next 24 months, and committing to establishing E-85 refueling facilities to meet the needs of the fleet[21]. The extent of private ownership of E-85 vehicles in the state

[20] Commission for the Transportation Disadvantaged, October 2002.

[21] FDOT District Seven. Installation of four 1,000-gallon E-85 tanks completed November 2002. All programmed vehicle acquisitions 2002 – 2003 to be E-85 flex fuel capable.

without access to refueling infrastructure for ethanol is significant. It is estimated that over 200,000 privately owned E85-capable vehicles are currently on the roads in Florida[22], all of them currently operating on regular gasoline. DaimlerChrysler alone will ship in excess of 30,000 E-85 minivans to Florida for sale during each of the model years 2002 and 2003, and estimates indicate that DaimlerChrysler, Ford and General Motors together will add another 50,000 E-85 vehicles to this count each year at least through 2006. Most consumers, and many vehicle retailers, are not aware of the flex-fuel E-85 capability of these vehicles. Although the awareness of flex-fuel E-85 capability is primarily a marketing problem, without infrastructure, any promotion will not be very effective. If E-85 refueling sites were more readily available, these consumers could be informed and provided with the option of refueling their cars with an alternative fuel.

3. RELEVANCE TO FLORIDA STATE AGENCY MISSIONS

Although the Clean Fuel Florida Advisory Board's focus is on the transportation aspects of energy policy formulation for the Florida Energy Office and the Department of Community Affairs, the issues of energy dependence, environmental quality and economic development are far reaching and of vital significance to the Florida as a whole, crossing departmental agendas. Accordingly, the Clean Fuel Florida Advisory Board has been cognizant to consider the

missions and goals of a number of State departments in formulating policy recommendations for Florida. Subsequently, the Board recognizes that many of the recommendations provided in this report will not be the domain of just the Florida Energy Office and Department of Community Affairs, but will be particularly pertinent to various departments acting in either a singular or collaborative manner. The findings of this report and the subsequent recommendations fit particularly well with the goals and mission of Community Affairs, Environmental Protection, Management Services and Transportation.

Department of Community Affairs[23]

The Department of Community Affairs mission to assist communities in the State meet the challenges of growth points to a strong and logical connection to the agency taking a lead role in promoting the use of alternative fuels and advanced transportation technologies throughout the State.

Examining the agency's core values reveals an even greater understanding for its role in this field. The Department of Community Affairs is committed to freely sharing its ideas, resources, and talents throughout the State. The Agency also values continual learning, bold thinking, constant reevaluation, and creative problem solving; all of which are characteristics vital in the effort to reduce Florida's dependence on petroleum.

Department of Environmental Protection[24]

The Florida Department of Environmental Protection, the lead agency in Florida government for environmental management and stewardship, administers regulatory programs and issues permits for air, water and waste management. According to Secretary David B. Struhs, "Our approach recognizes …by working together with Florida's citizens, businesses, environmental organizations and federal and local governments, we can achieve a cleaner environment, a higher quality of life and a stronger, more vibrant economy."[25]

Florida stands to gain environmentally in both the near and long term through the expanded use of alternative fuels in Florida by reducing mobile source emissions and the risk of groundwater contamination[26], and maintain the quality of life the State is renowned for while providing continued economic development opportunities.

Department of Management Services [27]

One of the Florida Department of Management Services's missions, is to "obtain the most effective and efficient use of motor vehicles…" (Chapter 287, *Florida Statutes*) for purchase and use by state agencies and local governments. As such, the Department of Management Services has the potential to play a key role in the promotion of alternative fuel use and

[22] CUTR, 2002

[23] Department Website: http://www.dca.state.fl.us/dcamission.htm

[24] Department Website: http://www8.myflorida.com/air/

[25] http://www8.myflorida.com/secretary/org/eaffairs.htm

[26] Groundwater contamination can occur through leaking underground storage tanks, fuel dispensing spills and runoff. Many alternative fuels provide for lesser risk of toxic spills and storage leakages.

[27] Department Website: http://www.state.fl.us/dms/sec/dmsoverview.html

alternative fuel vehicle implementation in Florida.

One pertinent function of the Department is to develop technical specifications and guidelines for acquisition of alternative fueled vehicles to ensure state compliance with the federally mandated Energy Policy Act of 1992. The Department has additional responsibilities that have the potential to increase alternative-fuel vehicle use in Florida including administering rental vehicle contracts; evaluating vehicle contract bids; and monitoring vehicle and equipment approvals for purchase by state agencies. The Clean Fuel Florida Advisory Board considers the issues addressed in this report as being particularly relevant to the mission that the Department of Management Services is charged to fulfill.

Florida Department of Transportation

The stated mission of the Florida Department of Transportation is "to provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity and preserves the quality of our environment and communities."[28] The Florida Department of Transportation work program also governs distribution of Congestion Mitigation and Air Quality funds that include provisions for alternative-fuel vehicle programs and alternative-fuel vehicle infrastructure projects. Effectively utilizing the States investment in infrastructure depends greatly on a reliable, available source of fuels. Diversifying the source of fuels for transportation through expanded use of alternative fuels will protect this investment and assist the Florida Department of Transportation in fulfilling its mission.

[28] Department Website:http://www11.myflorida.com/publicinformationoffice/moreDOT/mission.htm

Transportation Energy Plan Recommendations

CHAPTER 5

Transportation Energy Plan Recommendations

The following Clean Fuel Florida Advisory Board policy themes and recommendations have been developed through a consensus process to highlight the contributions that the expanded use of alternative fuels and alternative-fuel vehicles can make to Florida's Economic Prosperity, Environment and Community Quality. Implementation of these recommendations will:

- Support and enhance Florida's Alternative-fuel vehicle Infrastructure
- Create an organizational structure to support expanded Alternative-fuel vehicle use
- Expand levels of public awareness and general understanding of transportation issues, and
- Garner the support for research into the best application of emerging technologies such as hydrogen and fuel cells.

RECOMMENDATION 1.

Emerging Transportation Technology Business Development

HOST ALTERNATIVE FUELS AND ADVANCED TRANSPORTATION TECHNOLOGIES SUMMIT.

In evaluating the first steps to establish the sustainable development of an alternative fuels and advanced transportation technologies market in Florida, the Clean Fuel Florida Advisory Board has determined that the State must create heightened awareness and incentives for private sector involvement. This is essential to communicating clearly the highly desirable market opportunities that Florida possesses and to creating leveraged funding opportunities with non-government organizations and the private sector.

Utilizing the material presented in this report, the Clean Fuel Florida Advisory Board recommends that the Department of Community Affairs and the Florida Energy Office, Enterprise Florida and the Florida Chamber of Commerce host an "Alternative Fuels and Advanced Transportation Technologies" summit, at which the Governor and departmental heads can provide a forum for discussion among private and public interests of this report. A key function of this forum is to highlight the economic development and business opportunities Florida can provide to alternative fuel vehicle manufacturers and alternative fuel providers. Co-hosts and participants should include:

- Enterprise Florida
- Clean Cities Coalitions
- Metropolitan Planning Organization Advisory Council
- Florida League of Cities
- Regional Planning Councils
- American Public Transit Agency
- Community Transportation Association of America[1]
- Florida Public Transit Agency

Both government and industry representatives must understand the importance of private sector involvement and recognize that government investment can complement existing private sector plans to bring product to market at an earlier stage. Florida possesses a number of unique qualities that make it ideal for expanded alternative fuel use as highlighted by Clean Fuel Florida Advisory Board. In addition, Florida presents a market of significant size and rapid growth that make it attractive for investment, product development and economic development opportunities.

[1] Community Transportation Association of America is the sister agency to the American Public Transit Agency, and an advocate for rural and community transportation.

RECOMMENDATION 2.

Government Agency Leadership

ADOPT RULES FOR STATE FLEETS TO ACHIEVE ORIGINAL EPACT INTENT OF GREATER ALTERNATIVE FUEL USE.

The Energy Policy Act of 1992 mandated that a certain percentage of vehicle acquisitions in Federal, State and energy provider fleets be alternatively fueled, with the goal of diversifying fuel use and reducing the nation's dependence on foreign oil. The premise was that the demand for these vehicles and associated infrastructure by government fleets would spur development of alternative-fuel vehicles and assist manufacturers in lowering product costs and broadening model lines.

Research undertaken by the Center for Urban Transportation Research at the University of South Florida, at the direction of the Clean Fuel Florida Advisory Board, the Department of Community Affairs and the Florida Energy Office, found that this critical mass of alternative-fuel vehicle activity and demand had not and would not be achieved through the Energy Policy Act. Despite Florida's compliance with the Act mandates, a sustainable and viable alternative-fuel vehicle market will not be created through current program requirements, as the Act relies on vehicle procurement ratios that will neither achieve a critical mass of vehicles for a sustainable alternative-fuel vehicle market, nor significantly reduce the use of petroleum-based fuels. In addition to addressing the critical national security issue of the nations dependency on foreign oil, reductions in petroleum use can produce environmental and health gains and can improve the State's balance of payments.

Accordingly, the Clean Fuel Florida Advisory Board recommends that The Florida Legislature direct the Department of Community Affairs, the Department of Transportation, the Department of Environmental Protection and the Department of Management Services to cooperatively adopt a set of rules for State fleets that complement the Energy Policy Act requirements and achieve the original intent of greater alternative fuel use. These rules would shift focus to fuel use and gasoline/diesel displacement rather than vehicle acquisition, and should:

1. Encourage the use of alternative fuels in existing alternative-fuel vehicles operated by fleets (such as with propave and compress natural gas bi-fuel vehicles).
2. Encourage the use of transitional fuels (such as Ethanol, and Bio-diesel) in existing fleet vehicles where appropriate.
3. Encourage the acquisition of emerging technology vehicles (such as Hybrid-Electric Vehicles with high fuel efficiencies).
4. Incorporate niche-market vehicles (such as Battery Electric Vehicles), that are matched to specific fleet applications where appropriate, in place of traditional gasoline powered vehicles.

Consideration should also be given to assisting local and municipal fleets to adopt the rules as goals. As such, the rules should be developed under the joint direction of the Department of Community Affairs and the Florida Energy Office, the Department of Management Services, the Florida Department of Environmental Protection and the Florida Department of Transportation. Consultation should be sought from the Metropolitan Planning Organization Advisory Council, Regional Planning Councils, the Clean Cities Coalitions, and other local regulatory and rule making entities.

The legislation and rules should be designed to achieve the level of fuel use and gasoline/diesel displacement intended by the original Energy Policy Act mandate (Table 7), which required a certain percentage of vehicle acquisitions annually (and therefore fuel use) be alternative-fuel vehicles. The Clean Fuel Florida Advisory Board recommends that each State fleet adopt the most suitable technology (bio-fuels, emerging technologies, etc) for their specific application to achieve these goals.

Table 7 – EPACT Requirements

Year	Federal	State	AFP	Local Municipal
1997	25%	10%		
1998	50%	15%	30%	
1999	75%	25%	50%	
2000	75%	50%	70%	
2001	75%	75%	90%	
2002	75%	75%	90%	20%*
2003	75%	75%	90%	40%*
2004	75%	75%	90%	60%*
2005	75%	75%	90%	70%*
2006	75%	75%	90%	70%*

*Ruling yet to be ratified

RECOMMENDATION 3.

Alternative-fuel Vehicle Infrastructure and Vehicle Program Development

DEDICATED SOURCE(S) OF FUNDS FOR ALTERNATIVE-FUEL VEHICLE INFRASTRUCTURE RESEARCH, DEVELOPMENT AND IMPLEMENTATION.

Concurrent with creating a marketplace for increased alternative-fuel vehicle use, the Clean Fuel Florida Advisory Board recognizes the importance of an effective, efficient and convenient refueling infrastructure. A determination of what level of funding is necessary, and a suitable funding source should be established. Private sector entities also provide opportunities for infrastructure investment cost sharing. A recurring source of funds to match these opportunities and encourage public/private partnerships is an essential step in developing a broad infrastructure base to support alternative-fuel vehicle deployment.

Therefore, the Clean Fuel Florida Advisory Board recommends that the State identify a dedicated source(s) of funds for alternative-fuel vehicle infrastructure research, development and implementation. As one example of a dedicated source of funding, a $1 tag fee would generate in excess of $12.5 million based on year 2001 vehicle registrations.

Federal funding for almost 60 transportation related State Energy Program projects in 2000 was in excess of $7.2 million. SEP awards require matching funds or cost sharing in a range of 20 percent to 50 percent of the award amount from the respective state energy offices. Awards in seven categories ranged from $25,000 to $250,000 and are awarded on a competitive basis. The Clean Fuel Florida Advisory Board recommends the appropriation of funding dedicated to alternative-fuel vehicle transportation to effectively compete for federal matching funds and attract private sector investment. In 2000, matching funds of $355,000 would have been required to be successful in winning just one award from each category. The Clean Fuel Florida Advisory Board recommends this level of funding be appropriated annually for State Energy Program award matches, and for leverage with private sector projects on a minimum 50 percent cost share basis.

RECOMMENDATION 4.

Planning Code and Regulations

WORKSHOPS TO ASSIST IN DEVELOPING ALTERNATIVE FUEL VEHICLE REGULATIONS AND INFRASTRUCTURE NEEDS.

The Clean Fuel Florida Advisory Board recognizes that implementation of alternative-fuel vehicle programs requires a collaborative effort between regulators and end users. Accordingly, the Clean Fuel Florida Advisory Boardrecommends that the State, through the Department of Community Affairs provide assistance to local government and building officials to address in both comprehensive plans and building codes any needed provisions for alternative fuel vehicle refueling infrastructure in commercial and residential settings. This should also include better integration of plans, zoning and code provisions, and should draw upon successful experiences in Florida such as the South Florida Regional Planning Council Strategic Regional Policy Plan. Additionally, the Clean Fuel Florida Advisory Board recommends that the Florida Department of Community Affairs and the Florida Energy Office host workshops for planners and regulators from Regional Planning Councils, and other local regulatory and policy-making entities to assist them in developing regulations that address these needs. These workshops should be conducted as needed to help ensure that the aforementioned objectives are achieved.

The opportunities that advanced transportation technologies such as Neighborhood Electric Vehicles, City cars and Fuel Cell Vehicles (FCVs) provide for more effectively meeting individual transportation needs, present challenges for planners and regulatory agencies. Understanding that these vehicle types are not dependent upon traditional refueling infrastructure, and that they can assist in more efficient community planning is essential to facilitating widespread adoption of these new technologies. In many instances, code for electric vehicle recharging already exists. These regulations should not conflict with any existing code or requirement. Recharging and refueling infrastructure must be provided for in comprehensive plans, building codes and local regulations to ensure safety and uniformity and to facilitate growth of an alternative fuel vehicle market.

RECOMMENDATION 5.

Transportation System Funding

STUDY TO DEVELOP A METHODOLOGY TO PROVIDE A REVENUE STREAM FOR TRANSPORTATION INFRASTRUCTURE.

Successful implementation of alternative-fuel vehicle programs could have an impact on State fuel tax revenues, which help fund its roadway system. An efficient transportation network is vital to the sustained economic prosperity of the State. Traditional means of funding roadways through gasoline taxes are already strained, and considerable efforts are

underway by the Florida Department of Transportation to address projected funding shortfalls to maintain and expand the roadway system. Additionally, the fuels tax is a per-unit tax, and (in Florida) is not indexed to inflation. Therefore, in real terms, gas tax revenues are falling. The Clean Fuel Florida Advisory Board recognizes the critical nature of this funding issue.

The push for more fuel-efficient vehicles, regardless of fuel type, has the added potential for significant impact on fuel tax revenues. Moreover, many of the emerging technologies do not use standard units of gasoline or diesel, and so would not create fuel tax revenues in the traditional manner, or at a similar rate. These new technologies utilize fuels and energy sources that are difficult to apply traditional fuel taxes.

Therefore, the Clean Fuel Florida Advisory Board recommends a study be conducted in conjunction with the Florida Department of Transportation to develop a methodology to fairly and equitably provide a revenue stream that will protect and enhance the State's investment in transportation infrastructure. Concurrently, the need to provide an incentive for the early and widespread adoption of alternative energy sources for an increasing proportion of transportation energy use must also be addressed.

In the 2002 Legislative session, the Clean Fuel Florida Advisory Board sought the introduction of language (Appendix 1) to fund a study identifying the impact of expanded use of non-petroleum fuel and the improved efficiencies of emerging technology vehicles. The study is yet to be approved for funding. In conducting the recommended study, the Clean Fuel Florida Advisory Board considers that the perspectives of alternative fuel providers and emerging technology vehicle manufacturers be an integral element in determining the projected levels of market penetration, and the resulting fiscal impact that improved fuel economies and expanded use of non-petroleum based fuels may have on state revenues. Such a study should incorporate not only the funding needs of the Florida Department of Transportation, but also those of the Department of Community Affairs, the Florida Energy Office, the Florida Department of Environmental Protection, Enterprise Florida and other State agencies that may be involved in fostering an expanded alternative fuels market in the State. At the time of writing (December 2002), the Florida Department of Transportation is engaged at the national level in considering this issue. It is recommended that the study be completed within 12 months with summaries of completed work issued every 2 months. It is also recommended that the study include but not be limited to:

- Necessary partners for developing road funding policy
- Alternative-fuel vehicles and alternative fuel use market projections 5, 15, 25 years
- Fuel price projections (traditional and alternative fuels)
- Fuel tax revenue projections 5, 15, 25 years
- Funding needs shortfalls 5, 15, 25 years (Florida Department of Transportation, Florida Interstate Hiway System, Metropolitan Planning Organization Advisory Council)
- "best practices" of other states
- alternative road use tax collection methods, such as taxes based on energy use rather than road use

This study would be conducted by the Florida Department of Transportation as the lead agency and in collaboration with the Florida Energy Office. Both agencies would contribute to the cost of the study.

The results of the study should be presented to the governor, department and agency directors, the legislature, the Florida Transportation Commission and others as deemed appropriate. The report will be used to build consensus and recommendations for acting on policy and programs that could address this issue.

RECOMMENDATION 6.

Clean Fuel Transit Systems

DEVELOP EDUCATION AND OUTREACH PROGRAMS RELATED TO ALTERNATIVE FUEL TRANSIT.

In 2000, over 45,000 buses were in use in Florida. Over 5,000 of these were commercial or municipal transit and paratransit community transportation program vehicles; the balance consisted of school buses. A number of alternative fuel technologies such as bio-diesel, hybrid electric, and battery electric drive trains are ideally suited to certain transit and paratransit applications and can reap immediate benefits of reductions in emissions and dependence upon foreign oil. However, incremental capital costs for hybrid-electric and battery electric vehicles are significant, and per unit costs for fuels such as bio-diesel are not yet at parity with petro-diesel.

Accordingly, the Clean Fuel Florida Advisory Board recommends that the State work in partnership with the Florida Transit Association, the Florida Public Transit Association and any other organizations as deemed appropriate to develop education and outreach to transit and paratransit agencies and other member organizations related to alternative fuel transit. This education and outreach effort will include information on the current, available alternative-fuel vehicle transit including but not limited to addressing the incremental costs between current transit technology and alternative-fuel vehicle technology, challenges related to acquisition, maintenance, re-fueling

infrastructure, funding issues and other information needed to make informed decisions related to alternative-fuel vehicle transit and paratransit technologies. Utilizing the venue of conferences, meetings and other events held by Florida transit and paratransit organizations is an effective way to reach the intended audience and maximize limited resources. It is further recommended that the Florida Department of Transportation be designated as the lead state agency on this alternative-fuel vehicle transit and paratransit technology education and outreach effort.

An on-going program of education and identification of funding needs and resources will position the state to best leverage existing investments and transit agency support. Overseen by the Florida Department of Community Affairs's Florida Energy Office, the forums should complement existing Florida Department of Transportation programs, and should be used to communicate to manufacturers the market potential for alternative fuel transit and paratransit vehicles in Florida. An approach to address the funding needs for incremental operating costs should be identified and constrained to realistic targets for the market to achieve price-parity.

RECOMMENDATION 7.

Education and Outreach

EDUCATION AND OUTREACH ON AN ON-GOING STATEWIDE BASIS.

The diversity of the Clean Fuel Florida Advisory Board membership has provided the State with a broad range of perspectives on the issues of alternative fuels for transportation. However, it also highlighted the limited extent of understanding that industry experts, as well as elected officials and the general public, have of the specifics of alternative fuel use. In 1999, the Clean Fuel Florida Advisory Board, the Department of Community Affairs and the Florida Energy Office initiated the development of a Resource Manual[2] to ensure that all Clean Fuel Florida Advisory Board members were appropriately educated on alternative fuel issues.

Policy makers, planners, legislative staff and departmental managers have a range of knowledge of alternative fuel technologies, some with considerable expertise, and others with little knowledge or understanding. The Clean Fuel Florida Advisory Board recommends that a planned education and outreach effort be undertaken on an on-going statewide basis, coordinated and jointly funded by the Florida Department of Community Affairs, the Florida Energy Office, the Florida Department of Environmental Protection and the Florida Department of Transportation. Primary audiences for the initial phase of this program are elected officials, policy makers and legislators. Materials from the Clean Fuel Florida Advisory Board "Cornerstone Report", previous Clean Fuel Florida Advisory Board reports, as well as Clean Cities publications and other publications should be utilized in this program.

RECOMMENDATION 8.

State Energy Office

STAFFING, FUNDING AND LEADERSHIP ROLE OF FLORIDA ENERGY OFFICE

The need for a strong Energy Office is critical as our nation faces the many challenges related to transportation energy security. The Energy Office must be strong, well staffed and appropriately funded to support the current and emerging needs and to help ensure that Florida has a comprehensive and well designed plan that effectively addresses the state's transportation energy security.

The role of the Energy Office should encompass serving as a transportation energy resource to the Governor, Legislature and state agencies. In this capacity, the Energy Office should be knowledgeable about emerging transportation technologies and develop strategies for incorporating these technologies into Florida's transportation energy plan.

It is also recommended that the Clean Cities Coalitions model be reviewed for consideration in establishing and supporting a statewide network of Coalitions. Given adequate funding by the State, a local and statewide network of Clean Cities Coalitions would be instrumental in conveying Florida's plan for transportation energy security to residents and businesses. Marketing the plan to select audiences would help spread the word that Florida is a transportation-security-safe-state where one feels confident in building a business, in establishing a home or in making Florida a vacation destination. Additionally, the Clean Fuel Florida Advisory Board recommends that the Florida Energy Office not only continue with it's responsibility for developing, implementing and maintaining a strong, effective alternative-fuel vehicle education and outreach plan; but, also increase the efforts to ensure heightened awareness and promotion of alternative-fuel vehicle transportation technologies.

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[2] The Clean Fuel Florida Advisory Board's Alternative Fuel Vehicle and Infrastructure Resource Manual was provided to each member of the Clean Fuel Florida Advisory Board as well as the Florida Energy Office and Department of Community Affairs staff. At each meeting of the Clean Fuel Florida Advisory Board, additional material was provided to board members and Florida Energy Office staff for retention in the manual. Limited copies of this manual, incorporating periodic updates, datasets and reports are available from the Florida Energy Office or the Center for Urban Transportation Research at the University of South Florida.

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APPENDIX 1

Clean Fuel Florida Advisory Board Legislation

LEGISLATION RELATING TO ALTERNATIVE FUEL VEHICLES - SUMMARY

- **Clean Fuel Florida Advisory Board January 2001 report provided four recommendations to the Governor and the Secreatary of the Florida Department of Community Affairs**
- **Proposed Legislation follows Federal Programs (CLEAR Act)**
- **Minimal Fiscal Impact (Clean Fuel Florida Advisory Board has conducted preliminary estimates)**
- **To address needs of:**
  - Environment
  - Economy
  - Energy dependence
- **Florida can demonstrate leadership with minimal risk**
- **Legislation seeks to provide**
  - **Tax incentive for Alternative Fuel Vehicles**
    - Waives sales tax on Fuel Cell vehicles for 6 yrs
    - Waives sales tax on Hybrid vehicles for 6 yrs
    - Waives sales tax on dedicated alternative fuel vehicles for 6 yrs
  - **Flexibility in govt Alternative Fuel Vehicle purchases / Alternative Fuel Vehicle Infrastructure**
    - Allow use of non-OCO funds to purchase alternative fuel vehicles
    - Address insurance issues for public access to government sites
    - Ensure alternative fuel vehicles and fuel efficient vehicles are on State procurement listings
  - **Waiver of fuel tax decal (206.877)**
    - Currently onerous, disincentive to procure an alternative fuel vehicles
    - Most alternative fuel vehicles are government vehicles and are therefore not affected
  - **Gas tax revenue / emerging technologies impact study**
    - $400K, general fund, ongoing program
      - Address issue of declining fuel tax revenues
      - Understand impact of Emerging Technologies
      - Report on annual incentive program expense
      - Monitor new technologies / Projections
      - Ensure / safeguard state investment

By the Committee on Transportation; and Senator Sebesta

306-2055A-02

A bill to be entitled

An act relating to alternative fuels; amending s. 403.42, F.S.; revising the responsibilities of the Clean Fuel Florida Advisory Board and providing for its termination; providing an appropriation; providing an effective date.

Be It Enacted by the Legislature of the State of Florida:

Section 1. Subsection (3) of section 403.42, Florida Statutes, is amended to read:

403.42 Florida Clean Fuel Act.--

(3) CLEAN FUEL FLORIDA ADVISORY BOARD ESTABLISHED; MEMBERSHIP; DUTIES AND RESPONSIBILITIES.--

(a) The Clean Fuel Florida Advisory Board is established within the Department of Community Affairs.

(b)1. The advisory board shall consist of the Secretary of Community Affairs, or a designee from that department, the Secretary of Environmental Protection, or a designee from that department, the Commissioner of Education, or a designee from that department, the Secretary of Transportation, or a designee from that department, the Commissioner of Agriculture, or a designee from the Department of Agriculture and Consumer Services, the Secretary of Management Services, or a designee from that department, and a representative of each of the following, who shall be appointed by the Secretary of Community Affairs within 30 days after the effective date of this act:

a. The Florida biodiesel industry.

b. The Florida electric utility industry.

c. The Florida natural gas industry.

d. The Florida propane gas industry.
e. An automobile manufacturers' association.
f. A Florida Clean Cities Coalition designated by the United States Department of Energy.
g. Enterprise Florida, Inc.
h. EV Ready Broward.
i. The Florida petroleum industry.
j. The Florida League of Cities.
k. The Florida Association of Counties.
l. Floridians for Better Transportation.
m. A motor vehicle manufacturer.
n. Florida Local Environment Resource Agencies.
o. Project for an Energy Efficient Florida.
p. Florida Transportation Builders Association.

2. The purpose of the advisory board is to serve as a resource for the department and to provide the Governor, the Legislature, and the Secretary of Community Affairs with private sector and other public agency perspectives on achieving the goal of increasing the use of alternative fuel vehicles in this state.

3. Members shall be appointed to serve terms of 1 year each, with reappointment at the discretion of the Secretary of Community Affairs. Vacancies shall be filled for the remainder of the unexpired term in the same manner as the original appointment.

4. The board shall annually select a chairperson.

5.a. The board shall meet at least once each quarter or more often at the call of the chairperson or the Secretary of Community Affairs.

CODING: Words ~~stricken~~ are deletions; words <u>underlined</u> are additions.

b. Meetings are exempt from the notice requirements of chapter 120, and sufficient notice shall be given to afford interested persons reasonable notice under the circumstances.

6. Members of the board are entitled to travel expenses while engaged in the performance of board duties.

7. The board shall terminate on July 1, 2004 ~~5 years after the effective date of this act.~~

(c) The board shall review the performance of the state with reference to alternative fuel vehicle implementation in complying with federal laws and maximizing available federal funding and may:

1. Advise the Governor, Legislature, and the Secretary of Community Affairs and make recommendations regarding implementation and use of alternative fuel vehicles in this state.

2. Identify potential improvements in this act and the state's alternative fuel policies.

3. Request from all state agencies any information the board determines relevant to board duties.

4. Regularly report to the Secretary of Community Affairs, the Governor, the President of the Senate, and the Speaker of the House of Representatives regarding the board's findings and recommendations.

(d)~~1.~~ The advisory board shall, by January 1, 2003 ~~within 120 days after its first meeting,~~ make recommendations to the Department of Community Affairs, the Governor, and the Legislature regarding:

1. The impact of emerging transportation technologies, including, but not limited to, hybrid vehicles, fuel cells, and hydrogen fuels, on state transportation revenues derived

from motor fuel taxes as a result of improved fuel efficiencies and increased use of alternative fuels.

2. The impact of emerging transportation technologies on transportation infrastructure such as, but not limited to, fuel distribution, refueling infrastructure, and technology and training needs, especially with regard to the pending impact of fuel cell technology on transportation and energy.

3. The development of emerging transportation technologies and their potential for impact on this state's investment in transportation.

4. The projected costs of an alternative fuel vehicle incentive program.~~for establishing pilot programs in this state that provide experience and support the best use expansion of the alternative fuel vehicle industry in this state. No funds shall be released for a project unless there is at least a 50-percent private or local match.~~

~~2. In addition to the pilot programs, the advisory board shall assess federal, state, and local initiatives to identify incentives that encourage successful alternative fuel vehicle programs; obstacles to alternative fuel vehicle use including legislative, regulatory, and economic obstacles; and programs that educate and inform the public about alternative fuel vehicles.~~

~~3. The advisory board is charged with determining a reasonable, fair, and equitable way to address current motor fuel taxes as they apply to alternative fuels and at what threshold of market penetration.~~

~~4. Based on its findings, the advisory board shall develop recommendations to the Legislature on future alternative fuel vehicle programs and legislative changes that provide the best use of state and other resources to enhance~~

1 the alternative fuel vehicle market in this state and maximize
2 the return on that investment in terms of job creation,
3 economic development, and emissions reduction.
4 (e) The advisory board, working with the Department of
5 Community Affairs, shall develop a budget for the department's
6 approval, and all expenditures shall be approved by the
7 department. At the conclusion of the first year, the
8 department shall conduct an audit of the board and board
9 programs.
10 Section 2. The sum of $50,000 is appropriated to the
11 Center for Urban Transportation Research for the purpose of
12 assisting the Clean Fuel Florida Advisory Board in the
13 preparation of the report provided in section 403.42(3)(d),
14 Florida Statutes. The Department of Transportation shall
15 assist the advisory board by sharing any relevant studies to
16 prevent the duplication of effort.
17 Section 3. This act shall take effect July 1, 2002.
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CODING:Words stricken are deletions; words underlined are additions.

STATEMENT OF SUBSTANTIAL CHANGES CONTAINED IN COMMITTEE SUBSTITUTE FOR
Senate Bill 1664

This CS would require the Clean Fuel Florida Advisory Board to report to the Department of Community Affairs, the Governor and the Legislature by January 1, 2003 regarding:

1. The impact of emerging transportation technologies on state transportation revenues derived from motor fuel taxes;
2. The impact of emerging transportation technologies on transportation infrastructure such as fuel distribution and refueling infrastructure;
3. The development of emerging transportation technologies and their potential for impact on this state's investment in transportation; and
4. The projected costs of an alternative fuel vehicle incentive program.

The Center for Urban Transportation Research is appropriated $50,000 to assist in the study; the Department of Transportation is required to assist in the study to avoid any duplication of effort.

CODING: Words ~~stricken~~ are deletions; words underlined are additions.

APPENDIX 2

Peer State Selection

To facilitate valid comparisons between Florida and other states in the continental United States, a process known as Cluster Analysis was utilized to determine those with characteristics most similar to Florida's. To achieve this, cluster analysis classifies a set of observations into two or more mutually exclusive unknown groups based on combinations of interval variables. The purpose of cluster analysis is to organize observations (in this case Florida and other states) into groups, where members of the groups share properties in common.

The most straightforward way of computing distances between objects in a multidimensional space is to compute Euclidean distances. If we had a two or three-dimensional space, this measure is the actual geometric distance between objects in the space (i.e., as if measured with a ruler). The cluster analysis will compute various types of distance measures; the most commonly used being the Euclidean distance, which is simply the geometric distance in the multidimensional space.

The results of the application of the clustering technique are best described using a dendogram or binary tree. The objects are represented as nodes in the dendogram and the branches illustrate when the cluster method joins subgroups containing that object. The length of the branch indicates the distance between the subgroups when they are joined. The joining rule herein used is the complete linkage. Complete linkage computes the distance between subgroups in each step as the maximum distance between any two members of the different groups.

Using this Process, six states were identified as peers to Florida. For the focus of this report, transportation related factors such as population densities, population growth rates, Vehicle Miles traveled, fuel use and vehicle registrations were considered. The selection of relevant peer cities followed three steps:

1. Identification of relevant variables
2. Data collection for all US mainland states
3. Cluster analysis for final selection

The first step was to identify relevant variables. Five variables were identified for which relevant comparative data would be consistently available, these being;

- Population density per square mile
- Population growth, 1990-2000
- Total Motor fuel Tax receipts, Gross
- Total Vehicle Miles Traveled per capita
- Total Vehicle registrations- per capita

All variables were retained because of their relevance and correlation to the transportation demand and their statistical significance (factor determinant analysis determined their eligibility/usefulness).

The second step was to collect the relative data for the following variables for all states. Once the matrix was created, the Center for Urban Transportation Research proceeded to perform a cluster analysis to identify those states that have more characteristics in common to Florida. Figure 1 shows the dendogram tree for the out-of-state peer location selections. The objects of the clusters are the 52 states. This shows Florida and Pennsylvania forming a unique cluster, with New York and Ohio being the next most similar states (Figure 2).

Figure 1-Tree Diagram of Out of State Peer Locations

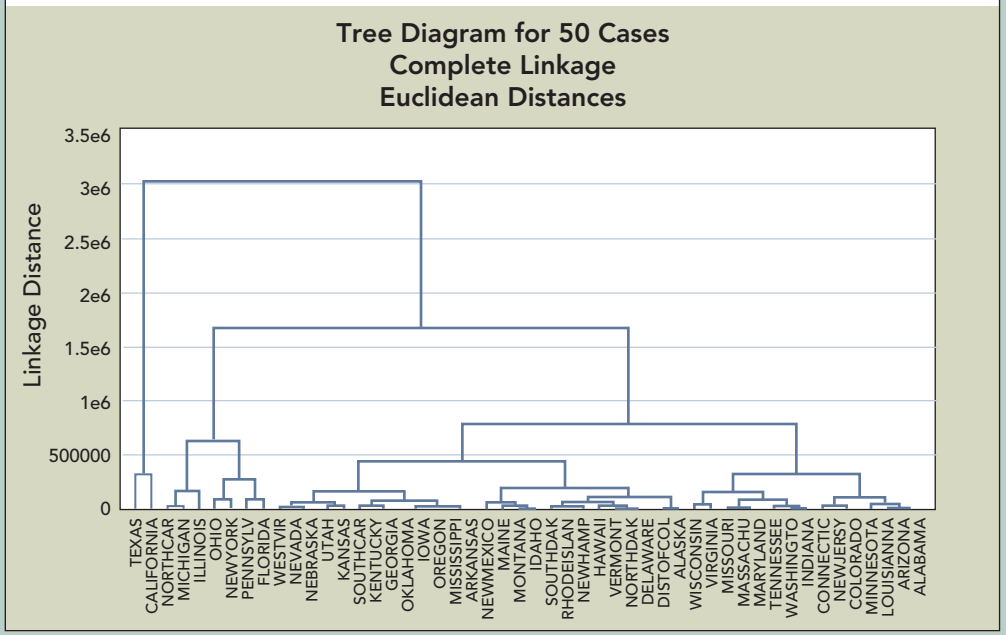
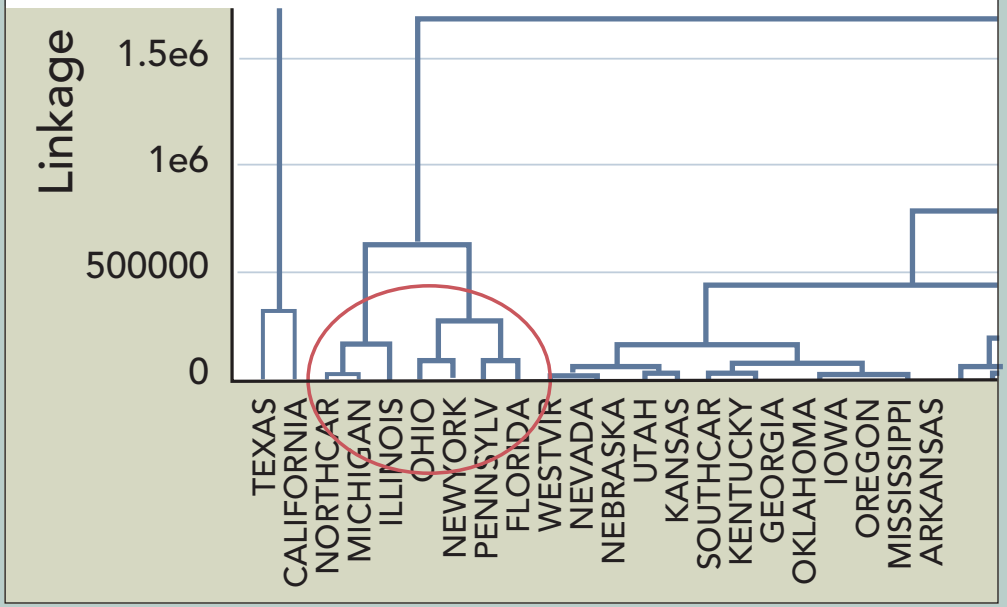


Figure 2 – States with Characteristics Common to Florida



Florida Motor Vehicle Fleet

FLORIDA FLEET SIZE AND COMPOSITION

FLORIDA VEHICLE REGISTRATIONS

REGISTRATION ISSUED (by type) - Florida	2000-2001	2001-2002	Growth (%)	2002-2003 (estimate)
Passenger Cars and Trucks	12,452,191	12,701,234	1.99 %	12,955,258
Mobile Homes	559,284	570,469	1.99 %	481,878
Motorcycles	299,424	305,412	1.99 %	311,520
Truck Tractors	513,241	523,505	1.99 %	533,975
Recreational Vehicles	217,047	221,387	1.99 %	225,814
Trailers	1,250,720	1,275,734	1.99 %	1,301,248
Other Vehicle Types	66,333	67,659	1.99 %	69,012
TOTAL VEHICLES REGISTERED	**15,358,840**	**15,666,016**	**1.99 %**	**15,979,336**

FLORIDA VEHICLE TITLES

TITLES ISSUED (by type) - Florida	2000-2001	2001-2002	Growth (%)	2002-2003 (estimate)
New Vehicle Titles	1,224,142	1,248,624	1.99 %	1,273,596
Used Vehicle Titles	541,082	551,903	1.99 %	562,941
Transfer Vehicle Titles	2,363,549	2,410,819	1.99 %	2,459,035
Miscellaneous Vehicle Titles	361,078	368,299	1.99 %	375,664
TOTAL VEHICLE TITLES	**4,489,851**	**4,579,648**	**1.99 %**	**4,671,250**

FLORIDA VEHICLE REGISTRATIONS 1980 – 2002

MOTOR VEHICLES - FLORIDA

Year	Automobiles	Buses	Trucks	All Motor Vehicles	% Change
1980	6,196,637	29,260	1,387,642	7,613,539	
1981	6,484,571	30,380	1,459,147	7,974,098	4.74%
1982	6,753,616	32,178	1,548,800	8,334,594	4.52%
1983	7,113,942	33,276	1,661,268	8,808,486	5.69%
1984	7,552,367	34,406	1,807,402	9,394,175	6.65%
1985	7,686,336	35,816	2,142,683	9,864,835	5.01%
1986	8,054,324	34,208	2,272,980	10,361,512	5.03%
1987	8,095,424	34,845	2,553,321	10,683,590	3.11%
1988	8,259,530	35,543	2,688,581	10,983,654	2.81%
1989	8,416,174	36,247	2,754,483	11,206,904	2.03%
1990	8,113,064	36,846	2,799,896	10,949,806	-2.29%
1991	7,135,394	37,501	2,807,181	9,980,076	-8.86%
1992	7,194,595	38,135	2,999,606	10,232,336	2.53%
1993	7,049,970	38,761	3,080,825	10,169,556	-0.61%
1994	7,086,485	39,564	3,125,761	10,251,810	0.81%
1995	7,097,499	40,264	3,231,632	10,369,395	1.15%
1996	7,285,563	41,161	3,561,872	10,888,596	5.01%
1997	7,374,840	42,076	3,457,115	10,874,031	-0.13%
1998	7,437,597	43,077	3,795,715	11,276,389	3.70%
1999	7,304,601	44,045	4,041,067	11,389,713	1.00%
2000	7,352,705	45,011	4,383,294	11,781,010	3.44%
2001				12,518,524	6.26%
2002*				12,768,893	2.00%

Source: BEBR 2001

FLORIDA AND PEER STATE VEHICLE REGISTRATIONS 1980 - 2002

VEHICLES REGISTERED IN FLORIDA AND PEER STATES

Year	FL		PA		NY		OH	
	Total	Change %	Total	Change %	Total	Change %	Total	Change %
1980	7,613,539		6,925,855		8,001,546		7,771,236	
1981	7,974,098	4.74	7,009,902	1.21	8,119,763	1.48	7,737,264	-0.44
1982	8,334,594	4.52	6,724,739	-4.07	8,234,857	1.42	7,635,860	-1.31
1983	8,808,486	5.69	6,844,049	1.77	8,416,503	2.21	7,768,345	1.74
1984	9,394,175	6.65	7,081,271	3.47	8,644,460	2.71	7,893,777	1.61
1985	9,864,835	5.01	7,209,093	1.81	9,041,825	4.60	8,101,612	2.63
1986	10,361,512	5.03	7,477,017	3.72	9,515,375	5.24	8,159,171	0.71
1987	10,683,590	3.11	7,642,206	2.21	9,592,732	0.81	8,521,397	4.44
1988	10,983,654	2.81	7,766,029	1.62	9,838,308	2.56	8,611,996	1.06
1989	11,206,904	2.03	7,909,379	1.85	10,020,539	1.85	9,513,918	10.47
1990	10,949,806	-2.29	7,971,470	0.79	10,196,153	1.75	8,410,466	-11.60
1991	9,980,076	-8.86	8,037,808	0.83	9,771,437	-4.17	8,684,599	3.26
1992	10,232,336	2.53	8,179,231	1.76	9,779,554	0.08	9,029,829	3.98
1993	10,169,556	-0.61	8,282,066	1.26	10,162,501	3.92	9,278,973	2.76
1994	10,251,810	0.81	8,482,387	2.42	10,196,166	0.33	9,663,727	4.15
1995	10,369,395	1.15	8,480,526	-0.02	10,274,036	0.76	9,810,270	1.52
1996	10,888,596	5.01	8,640,238	1.88	10,635,602	3.52	9,770,484	-0.41
1997	10,874,031	-0.13	8,824,947	2.14	10,873,248	2.23	10,107,651	3.45
1998	11,276,389	3.70	8,978,814	1.74	10,422,033	-4.15	10,039,488	-0.67
1999	11,389,713	1.00	9,008,600	0.33	10,756,026	3.20	10,235,603	1.95
2000	11,781,010	3.44	9,259,967	2.79	10,234,531	-4.85	10,467,476	2.27
2001	12,518,524	6.26			10,706,563			
2002	12,768,893	2.00						

Source: BEBR 2001

APPENDIX 4

Clean Fuel Florida Advisory Board Alernative Fuel Vehicle Inventory

To gain a clear understanding of the extent of alternative fuel vehicle activity in Florida, the Clean Fuel Florida Advisory Board commissioned an inventory of all alternative fuel vehicles and alternative fuel vehicle refueling sites in the state. The inventory sought to identify the type, owner/operator and location of all alternative fuel vehicles and refueling facilities in Florida. Estimates from the Department of Energy indicated in excess of 12,000 alternative fuel vehicles in the state, and in order to make sound policy recommendations, the Clean Fuel Florida Advisory Board needed to know if this was the true extent of alternative fuel vehicle activity in Florida. The survey, conducted June through October 2000 by the Center for Urban Transportation Research at the University of South Florida, identified 5,725 alternative fuel vehicles in 25 counties in Florida. The discrepancy between U.S. Department of Energy estimates and the actual inventory was found to be the result of projections made in the early 1990's by vehicle manufacturers and fuel providers being regarded as fact by the Department in the late 1990's. The state's inventory of alternative fuel vehicles is comprised of vehicles operating on compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas or propane (LPG), ethanol (E85), methanol (M85), bio-diesel, and electric-powered vehicles (EV). Liquefied Petroleum Gas (LPG) vehicles constituted the largest part (43 percent) of the inventory of alternative fuel vehicles. CNG vehicles were the second largest group (38 percent) with 2,151 vehicles. The inventory counted only E85 flex-fuel vehicles using E85 as a fuel at the time, and did not count the estimated 98,000 E-85 flex-fuel vehicles operating in the private sector that use gasoline.

Table 1 details the number of the alternative fuel vehicles in Florida, and Table 2 illustrates the number of refueling sites for alternative fuel vehicles.

TABLE 1:
FLORIDA ALTERNATIVE FUEL VEHICLES INVENTORY - SUMMARY

VEHICLE INVENTORY	
FUEL TYPE	TOTAL VEHICLES
CNG	2,151
LPG	2,466
E85[1]	601
EV[2]	352
Bio-Diesel[3]	128
M85	11
Hybrid-elec. Transit[4]	16
TOTAL	**5,725**

[1] Includes only fleet vehicles operated on E85

[2] Includes Neighborhood Electric Vehicles (NEVs)

[3] Includes diesel fleet vehicles operated on B20 Bio-diesel

[4] Hybrid-electric transit vehicles using bio-diesel and compress Natural Gas

Source: Center for Urban Transportation Research at the U. of S. Fla. 2000

TABLE 2:
FLORIDA ALTERNATIVE FUEL VEHICLE REFUELING SITE INVENTORY

VEHICLE INVENTORY

Fuel Type	Total Sites
CNG	94
LPG	320
LNG	2
E85[1]	0
EV	93
Bio-Diesel	2
M85	2
TOTAL	**513**

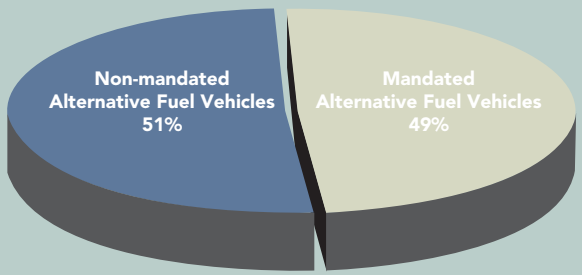
[1] E85 is supplied on-site to vehicle fleets

Source: Center for Urban Transportation Research at the U. of S. Fla. 2000

The inventory identified 513 alternative fuel-refueling sites in 59 counties. Eight counties had no alternative fuel vehicle refueling sites. There weren't any ethanol refueling sites located in the state. The apparent inconsistency between vehicle locations and refueling sites can be attributed to several different issues. The presence of a vehicle does not always predicate the presence of a refueling site. In some instances, a bi-fuel vehicle, capable of using traditional petroleum products as well as an alternative fuel, would be reported as an alternative fuel vehicle, yet it would not necessarily require an alternative fuel refueling site to support its operation. Another issue with the inventory process is that many reported propane sites offer propane as a cooking fuel but are not vehicle-refueling capable. The inventory included only those sites capable of vehicle refueling.

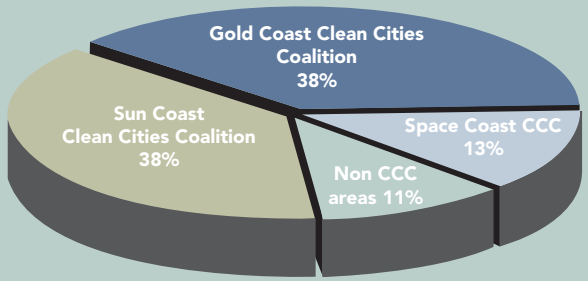
Over half (51 percent) of the reported alternative fuel vehicles were private, business or local fleet operated vehicles that were not subject to federal mandates (EPACT) requiring the use alternative fuels (Figure 1). Of the reported 5,725 alternative fuel vehicles in Florida, the federal government fleet operated 33 percent, state government fleets operated 3 percent, and energy providers operated 13 percent. The remaining 2,920 alternative fuel vehicles (51 percent) had been acquired by those who are not subject to any mandate.

FIGURE 1:
ALTERNATIVE FUEL VEHICLES BY MANDATE



It was evident from the data that the Clean Cities Coalitions had direct impact on the distribution of the alternative fuel vehicles in Florida (Figure 2). The three Florida Clean Cities Coalitions are the Gold Coast Clean Cities Coalition, the Sun Coast Clean Cities Coalition, and the Space Coast Clean Cities Coalition. This distribution to reflects the significant efforts and success of the Florida Clean Cities Coalitions to increase alternative fuel usage in the state.

FIGURE 2:
ALTERNATIVE FUEL VEHICLES BY CLEAN CITIES COALITION



Almost 90 percent of all alternative fuel vehicles in Florida are located within one of the three coalition areas. The Gold Coast Coalition and Sun Coast Coalitions each encompass areas that include 38 percent each of all alternative fuel vehicles in Florida, and the SpaceCoast Coalition 13 percent.

ALTERNATIVE FUEL VEHICLES OPERATING IN FLORIDA IN 2000

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Ferrellgas	Alachua					4					4	-	E
Ferrellgas	Alachua					11					11	-	E
Ferrellgas - customers	Alachua					3					3	-	P
Peoples Gas	Alachua					7					7	-	E
Suburban Propane	Alachua					7					7	-	E
Peoples Gas	Baker					1					1	-	E
Yarborough Gas	Baker					4					4	-	E
Peoples Gas	Bay					1					1	-	E
Superior Propane Gas	Bay					7					7	-	E
Peoples Gas	Bradford					7					7	-	E
Sawyer Gas of Starke	Bradford					12					12	-	E
Amerigas	Brev/IndRvr/Vol/Lake					42					42	SpC	E
Florida DOT	Brev/Ornge/Vol	21									21	SpC	S
AF IFMS	Brevard	1									1	SpC	F
Brevard County Sherriff's Office	Brevard										0	SpC	C
Brevard County Solid Waste	Brevard										0	SpC	C
City Gas Company	Brevard					20					20	SpC	E
City of Cape Canaveral	Brevard										0	SpC	C
City of Cocoa Beach	Brevard										0	SpC	C
DLA	Brevard						1				1	SpC	S
Florida Tech	Brevard	1					3				4	SpC	S
Horizon Gas	Brevard					4					4	SpC	E
Melbourne Police Department	Brevard			2							2	SpC	C
NASA IFMS	Brevard		1								1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1									1	SpC	F
NASA IFMS	Brevard	1	1								2	SpC	F
NASA IFMS	Brevard	2									2	SpC	F
NASA IFMS	Brevard	3									3	SpC	F
NASA IFMS	Brevard	3									3	SpC	F
NASA IFMS	Brevard	5									5	SpC	F
NASA IFMS	Brevard	6									6	SpC	F
NASA IFMS	Brevard	8									8	SpC	F
NASA IFMS	Brevard	24									24	SpC	F
NASA IFMS	Brevard	29									29	SpC	F
NASA IFMS	Brevard	35	1								36	SpC	F
Palm Bay High School	Brevard			1							1	SpC	C
Patrick AFB/Cape Canaveral AFS	Brevard	6									6	SpC	F

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Space Coast Transit	Brevard										0	SpC	C
St. Johns Water Management	Brevard	3									3	SpC	C
Suburban Propane	Brevard					2					2	SpC	E
Thrifty Tru - Gas	Brevard					3					3	SpC	E
UCF	Brevard	2		2							4	SpC	C
USCF FL Solar Center	Brevard	1		6							7	SpC	C
AF IFMS	Broward	2									2	GC	F
Amerigas Propane LP	Broward					10					10	GC	E
ASAP Roofing	Broward					1					1	GC	P
Atlantic Gas Corporation	Broward					4					4	GC	E
Boye's Gas Service, Inc.	Broward					6					6	GC	E
Broward County Aviation Dept.	Broward	10		1							11	GC	C
Broward County Public Works	Broward	103		19		25					147	GC	C
Broward County School Board	Broward	2									2	GC	C
City of Coconut Creek	Broward			6		25					31	GC	C
City of Hollywood	Broward	183									183	GC	C
Coast Gas - Pompano Beach	Broward					12					12	GC	E
Coconut Creek	Broward								4		4	GC	C
Columbia Propane Corporation	Broward					15					15	GC	E
Coral Springs	Broward					264					264	GC	C
DOT IFMS	Broward	2									2	GC	F
Fort Lauderdale	Broward	2									2	GC	C
Fort Lauderdale	Broward							5	2		7	GC	C
Ft. Lauderdale-rental veh. (NEV)	Broward			50							50	GC	C
GSA	Broward	1									1	GC	F
HHS IFMS	Broward		2								2	GC	F
Lauderhill	Broward	2				28					30	GC	C
NAVY IFMS	Broward	1									1	GC	F
NAVY IFMS	Broward	1									1	GC	F
NAVY IFMS	Broward	1									1	GC	F
NAVY IFMS	Broward	2									2	GC	F
SSA IFMS	Broward		3								3	GC	F
Sunrise	Broward	136									136	GC	C
USPS	Broward	47									47	GC	F
USPS IFMS	Broward	1									1	GC	F
USPS IFMS	Broward	1									1	GC	F
USPS- S FL District	Broward	171	301			36		53			561	GC	F
USPS - Lake Mary	Brvrd/Lake//Vol	49									49	SpC	F
Amerigas Propane LP	Calhoun					6					6	-	E
Chipola Propane Gas	Calhoun					1					1	-	E
Ferrellgas	Charlotte					3					3	SC	E
Schwann's Sales	Charlotte					10					10	SC	P
Amerigas Propane LP	Citrus					5					5	SC	E
Anderson Gas Service	Citrus					2					2	SC	E
Anderson Gas Service, Inc.	Citrus					2					2	SC	E
Bay Area Air Conditioning	Citrus					8					8	SC	P
Columbia Propane Corporation	Citrus					3					3	SC	E
Columbia Propane Corporation	Citrus					3					3	SC	E

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Ferrellgas	Citrus					3					3	SC	E
Heritage Propane	Citrus					4					4	SC	E
Suburban Propane	Citrus					4					4	SC	E
AA Propane Gas, Inc.	Clay					5					5	-	E
Sawyer Gas of Green Cove	Clay					6					6	-	E
Amerigas Propane LP	Collier					2					2	SC	E
Amerigas Propane LP	Collier					4					4	SC	E
City of Naples Public Works	Collier					6					6	SC	C
Collier County Sherriff's Office	Collier			1							1	SC	C
Ferrellgas	Collier					7					7	SC	E
Adams LP Gas of Lake City	Columbia					3					3	-	E
Sawyer Gas of Lake City	Columbia					1					1	-	P
Sawyer Gas of Lake City	Columbia					7					7	-	E
Suburban Propane	Columbia					3					3	-	E
AF IFMS	Dade	1									1	GC	F
AF IFMS	Dade	1									1	GC	F
AF IFMS	Dade	3									3	GC	F
AIR FORCE	Dade		14								14	GC	F
ARMY IFMS	Dade	1									1	GC	F
ARMY IFMS	Dade	1									1	GC	F
ARMY IFMS	Dade	9									9	GC	F
Dolphin Gas System	Dade					8					8	GC	E
DOT IFMS	Dade	1									1	GC	F
DOT IFMS	Dade	1									1	GC	F
DOT IFMS	Dade	1									1	GC	F
DOT IFMS	Dade	2									2	GC	F
GSA	Dade	1									1	GC	F
HHS IFMS	Dade		2								2	GC	F
Home Gas Corporation	Dade					8					8	GC	E
Miami Electrowave (Transit)	Dade			11							11	GC	C
NAVY IFMS	Dade	1									1	GC	F
NAVY IFMS	Dade	1									1	GC	F
NAVY IFMS	Dade	1									1	GC	F
NAVY IFMS	Dade	1									1	GC	F
NAVY IFMS	Dade	2									2	GC	F
STATE IFMS	Dade		1								1	GC	S
Suburban Propane	Dade					15					15	GC	E
Sungas Corporation	Dade					13					13	GC	E
USPS	Dade	41									41	GC	F
VA IFMS	Dade	1									1	GC	F
Coast Gas	Dixie					4					4	-	E
Amerigas Propane LP	Duval					3					3	-	E
B&B Exterminating	Duval					2					2	-	P
B&G Plumbing	Duval					1					1	-	P
Burch Welding	Duval					4					4	-	P
City of Jacksonville	Duval					70					70	-	C
Columbia Propane Corporation	Duval					6					6	-	E
D&D Bottle Gas	Duval					5					5	-	E

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
DOT IFMS	Duval		1								1	-	F
Mobile Gas Company	Duval					22					22	-	E
NAVY	Duval	44									44	-	F
NAVY IFMS	Duval	2									2	-	F
NAVY IFMS	Duval	23	1								24	-	F
Sawyer Gas	Duval					4					4	-	E
Sawyer Gas	Duval					13					13	-	E
Western Natural Gas	Duval					16					16	-	E
Blossman Gas, Inc.	Escambia					6					6	-	E
Community LP Gas	Escambia					6					6	-	E
DOD IFMS	Escambia		1								1	-	F
Peoples Gas	Flagler					2					2	-	E
Suburban Propane	Flagler					5					5	-	E
Amerigas Propane LP	Franklin					5					5	-	E
Quality Propane	Gadsden					4					4	-	E
Suburban Propane	Gadsden					3					3	-	E
Coker Fuel	Hardee					4					4	SC	E
Suburban Propane	Hardee					3					3	SC	E
Glades Gas Company	Hendry					8					8	SC	E
City of Brooksville Police Dept.	Hernando		1								1	SC	C
Heritage Propane	Hernando					1					1	SC	E
Suburban Propane	Hernando					2					2	SC	E
Coker Fuel, Inc.	Highlands					13					13	SC	E
Fuelgas	Highlands					4					4	SC	E
Ridge Fuel Company	Highlands					4					4	SC	E
Bay Area Commuter Services	Hillsborough										0	SC	P
BEMAC	Hillsborough					28					28	SC	P
Bob's Barricades	Hillsborough					10					10	SC	P
Busch Entertainment	Hillsborough					6					6	SC	P
Caterair	Hillsborough					8					8	SC	P
City of Tampa	Hillsborough					45					45	SC	C
City of Temple Terrace	Hillsborough			1						1	SC	C	
DIDEE Diaper Service	Hillsborough					5					5	SC	P
Dobb's	Hillsborough					10					10	SC	P
Entemannís Bakery	Hillsborough	25									25	SC	P
FDEP	Hillsborough	5									5	SC	S
FDOT - District 7	Hillsborough	11	7			27		55			100	SC	S
Ferrellgas	Hillsborough					4					4	SC	E
Florida Aquarium	Hillsborough	2									2	SC	P
GasMasters	Hillsborough					9					9	SC	P
Gate Gourmet	Hillsborough					16					16	SC	P
HARTline	Hillsborough	5							10		15	SC	C
Hillsboro Gas Company	Hillsborough					15					15	SC	E
Hillsborough Co. Sherriff's Office	Hillsborough			1							1	SC	C
Landcare	Hillsborough					5					5	SC	P
Peoples Gas	Hillsborough					10					10	SC	E
Peoples Gas System	Hillsborough	53				40					93	SC	E
Schwann's Sales	Hillsborough					12					12	SC	P

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Suburban Propane	Hillsborough					13					13	SC	E
Tampa Tribune	Hillsborough	16									16	SC	P
TECO	Hillsborough					140					140	SC	E
USF - College of Engineering	Hillsborough			5							5	SC	S
USGSA	Hillsborough	2									2	SC	F
USPS-Hillsdale	Hillsborough	48									48	SC	F
USPS-TCA	Hillsborough	63									63	SC	F
USPS-Ybor	Hillsborough	37									37	SC	F
VA IFMS	Hillsborough	2									2	SC	F
Waste Management	Hillsborough	1									1	SC	P
Columbia Propane Corporation	Indian River					4					4	SpC	E
Vero Beach Council on Aging	Indian Rvr										0	SpC	C
Vero Beach Police Department	Indian Rvr			2							2	SpC	C
Amerigas Propane LP	Jackson					4					4	-	E
Amerigas Propane LP	Jackson					4					4	-	E
Amerigas Propane LP	Jackson					4					4	-	E
Chipola Propane Gas	Jackson					2					2	-	E
Chipola Propane Gas	Jackson					11					11	-	E
Crutchfield Service	Jackson					7					7	-	E
Thermogas Company	Jackson					7					7	-	E
Blossman Gas, Inc.	Jefferson					4					4	-	E
City of Leesburg	Lake	34									34	SpC	C
Harris Propane	Lake					6					6	SpC	E
Heritage Propane	Lake					7					7	SpC	E
City of Fort Myers Police Dept	Lee			2							2	SC	C
Coast Gas	Lee					5					5	SC	E
Heritage Propane	Lee					3					3	SC	E
Lee County Sherriff's Office	Lee			1		300					301	SC	C
SeaGuard	Lee							1			1	SC	P
South Florida Gas Company	Lee					1					1	SC	E
Town of Fort Myers Beach	Lee			1							1	SC	C
USPS	Lee	1	168								169	SC	F
Leon Propane	Leon					4					4	-	E
Suburban Propane	Leon					16					16	-	E
Columbia Propane Corporation	Levy					2					2	-	E
Farmers Cooperative	Madison					2					2	-	E
Live Oak Gas Company	Madison					2					2	-	E
Pro Am Southeast	Madison					2					2	-	E
Amerigas Propane LP	Manatee					1					1	SC	E
Bradenton Propane Gas	Manatee					1					1	SC	E
Christie Plumbing	Manatee					10					10	SC	P
City of Anna Maria	Manatee			1							1	SC	C
City of Holmes Beach	Manatee			1		1					2	SC	C
City of Palmetto	Manatee			1							1	SC	C
Ferrellgas	Manatee					4					4	SC	E
Amerigas Propane LP	Marion					4					4	-	E
Atlantic Gas Corporation	Marion					2					2	-	E
Coast Gas	Marion					7					7	-	E

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Columbia Propane Corporation	Marion					9					9	-	E
Ferrellgas	Marion					2					2	-	E
Indiantown Gas Company	Martin					2					2	GC	E
Thermogas Company	Martin					13					13	GC	E
Via Tropical Fruits	Martin					18					18	GC	P
Florida Power & Light	Miami-Dade			41							41	GC	E
Miami Beach	Miami-Dade			14							14	GC	C
North Bay Village	Miami-Dade	23									23	GC	C
North Miami	Miami-Dade	134	2								136	GC	C
NUI City Gas Company of Fla	Miami-Dade	28									28	GC	E
Amerigas Propane LP	Monroe					9					9	GC	E
Key West - rental vehicles(NEV)	Monroe			80							80	GC	C
Suburban Propane	Monroe					1					1	GC	E
AF IFMS	Okaloosa		1								1	-	F
AIR FORCE	Okaloosa	58									58	-	F
AIR FORCE	Okaloosa	74									74	-	F
Columbia Propane Corporation	Okaloosa					4					4	-	E
DOD IFMS	Okaloosa		1								1	-	F
DOD IFMS	Okaloosa		1								1	-	F
DOD IFMS	Okaloosa	1									1	-	F
Central Gas Company	Okeechobee					1					1	SpC	E
Coast Gas	Orange					9					9	SpC	E
NAVY IFMS	Orange	1									1	SpC	F
Orange County School System	Orange			1							1	SpC	C
Orange County Transportation	Orange	10		20		16					46	SpC	C
Orlando Utility	Orange	3		3							6	SpC	E
Peoples Gas	Orange					4					4	SpC	E
Sams LP Gas Company	Orange					10					10	SpC	E
Walt Disney Corporation	Orange	1		10							11	SpC	P
Zeller International	Orange			1							1	SpC	P
National Propane	Ornge					29					29	SpC	E
Lynx	Ornge/Osc/Sem	16									16	SpC	P
Kissimmee Utility Authority	Osceola					3					3	SpC	E
Osceola County Schools	Osceola					8					8	SpC	C
Ferrellgas	Palm Beach					8					8	GC	E
Ferrellgas	Palm Beach					8					8	GC	E
Flo-Gas Corporation	Palm Beach					7					7	GC	E
Florida DEP-SE District	Palm Beach	3				1					4	GC	S
Glades Gas& Electric Corp.	Palm Beach					7					7	GC	E
Palm Beach County Fleet Mgt	Palm Beach	53									53	GC	C
Palm Beach Co.-Public Health	Palm Beach	5									5	GC	C
Palm Beach Gardens	Palm Beach	22									22	GC	C
Peoples Gas	Palm Beach					4					4	GC	E
Siegel Gas and Oil Corporation	Palm Beach					7					7	GC	E
USPS	Palm Beach	1									1	GC	F
VA IFMS	Palm Beach	6									6	GC	F
City of Zephyrhills Police Dept.	Pasco			1							1	SC	C
Pasco County Schools	Pasco										0	SC	C

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Pasco County Sherriff's Office	Pasco			1							1	SC	C
City of Clearwater	Pinellas	63									63	SC	C
City of Clearwater Police Dept	Pinellas			1							1	SC	C
City of Dunedin	Pinellas					3					3	SC	C
City of St Petersburg	Pinellas	45									45	SC	C
City of St Pete Bch Police Dept	Pinellas			1							1	SC	C
City of Tarpon Sps Police Dept	Pinellas			1							1	SC	C
Clearwater Gas System	Pinellas	37									37	SC	E
Cocoa Masonary	Pinellas					15					15	SC	P
Cornerstone Propane	Pinellas					3					3	SC	E
Ferrellgas	Pinellas					6					6	SC	E
Florida Power Corporation	Pinellas	42		7							49	SC	E
McGill Plumbing	Pinellas					8					8	SC	P
MotorFuelers, Inc.	Pinellas	7									7	SC	E
Neighborly Senior Service	Pinellas	28									28	SC	P
Peoples Gas	Pinellas					5					5	SC	E
Pinellas Co. Meals on Wheels	Pinellas	6									6	SC	P
PSTA	Pinellas			1							1	SC	C
PSTA	Pinellas	4									4	SC	C
Schwann's Sales	Pinellas					12					12	SC	P
SSA IFMS	Pinellas		1								1	SC	F
SSA IFMS	Pinellas		1								1	SC	F
SSA IFMS	Pinellas		1								1	SC	F
Tampa Baywatch	Pinellas	3									3	SC	P
USPS	Pinellas	70									70	SC	F
Amerigas Propane LP	Polk					8					8	SC	E
Coast Gas-Lakeland	Polk					11					11	SC	E
FDOT - District 1	Polk		10			12					22	SC	S
Polk County School Board	Polk	2									2	SC	C
Polk County Sherriff's Office	Polk			1							1	SC	C
Suburban Propane	Polk					7					7	SC	E
Suburban Propane-customers	Polk					3					3	SC	P
Travis Vo - Tech	Polk	2		1		2					5	SC	S
City of Lakeland	Polk	8		2							10	SC	C
Columbia Propane Corporation	Putnam					1					1	-	E
Putnam Propane	Putnam					4					4	-	E
St. Augustine Gas Company	Saint Johns					4					4	-	E
Coast Gas - customers	Saint Lucie					2					2	SpC	P
Coast Gas - Ft. Pierce	Saint Lucie					9					9	SpC	E
Coast Gas - Pensacola	Santa Rosa					4					4	-	E
NAVY	Santa Rosa	11									11	-	F
Bi - County LP	Sarasota					4					4	SC	E
City of Bradenton Beach	Sarasota			1							1	SC	C
City of North Port	Sarasota					1					1	SC	C
Dobbís House	Sarasota					4					4	SC	P
Horizon Gas	Sarasota					1					1	SC	E
Kennell Plumbing	Sarasota					5					5	SC	P
Marriotta Plumbing	Sarasota					3					3	SC	P

Operator	County	CNG	E-85	EV	LNG	LPG	M-85	Bio-Dsl	Hyb/Trst	Other	Total	Coalition AF Fleet	Fleet Type
Sarasota County Government	Sarasota					5					5	SC	C
Sarasota County Sheriff's Dept	Sarasota			1		260					261	SC	C
Suburban Propane	Sarasota					65					65	SC	E
Heritage Propane	Seminole					6					6	SpC	E
USPS	Seminole	1									1	SpC	F
ARMY IFMS	St. Johns	2									2	SpC	F
ARMY IFMS	St. Johns	4									4	SpC	F
City of Fort Pierce	St. Lucie	1									1	SpC	C
Fort Pierce Utilities	St. Lucie	13									13	SpC	E
St. Lucie County Schools	St. Lucie										0	SpC	C
Columbia Propane Corporation	Sumter					8					8	-	E
Suburban Propane	Sumter					8					8	-	E
Live Oak Gas Company	Suwanee					10					10	-	E
Suburban Propane	Suwanee					4					4	-	E
Atlantic Gas Corporation	Volusia					5					5	SpC	E
City of New Smyrna	Volusia										0	SpC	C
City of Ponce Inlet	Volusia										0	SpC	C
Daytona Beach Community Coll.	Volusia	1		6		1					8	SpC	C
Daytona News Journal	Volusia	22									22	SpC	P
Daytona Speedway	Volusia										0	SpC	P
Discount Propane	Volusia					4					4	SpC	E
Independent Service and Install.	Volusia					1					1	SpC	P
Peoples Gas	Volusia	15									15	SpC	E
Private Individuals	Volusia			16							16	SpC	P
Space Coast Colalition	Volusia		81	21	0		7	8		0	117	SpC	C
Volusia County	Volusia		1								1	SpC	C
Volusia County School Board	Volusia		1								1	SpC	C
Suburban Propane	Volusia/Brevard			6							6	SpC	E
Wakulla LP Gas	Wakulla			4							4	-	E
Community LP Gas	Walton			10							10	-	E
Dowdle Butane Gas	Walton			4							4	-	E
TOTALS			**2151**	**601**	**352**	**0**	**2466**	**11**	**128**	**16**	**0**	**5725**	

Note:
Although many fleet operators report the ownership of E-85 vehicles, only those actually using E-85 fuel in the vehicles are considered to have an alternative fuel vehicle.

FLEET TYPES
F Federal
S State
C City/County
E Energy Provider
P Non - Energy Provider, Private Owned

ASSOCIATION
GC Gold Coast
SC Sun Coast
SPC Space Coast

APPENDIX 5

Vehicle Miles Traveled in Florida

FLORIDA VEHICLE MILES TRAVELED, 1986–2000

YEAR	VEHICLE MILES TRAVELED (millions)
1986	87,325
1987	92,865
1988	105,030
1989	108,876
1990	109,997
1991	113,484
1992	114,000
1993	119,768
1994	120,929
1995	127,800
1996	129,637
1997	133,276
1998	136,680
1999	145,196
2000	148,496

Source: State of Florida Department of Highway Safety and Motor Vehicles, 2002

FLORIDA'S PER CAPITA VEHICLE MILES TRAVELED, 1986—2001

YEAR	VEHICLE MILES TRAVELED PER CAPITA
1986	7,480
1987	7,805
1988	8,568
1989	8,615
1990	8,502
1991	8,542
1992	8,475
1993	8,784
1994	8,910
1995	9,009
1996	9,011
1997	9,126
1998	9,223
1999	9,396
2000	9,609
2001	9,531

Source: State of Florida Department of Highway Safety and Motor Vehicles, 2002, BEBR, CUTR

VEHICLE MILES TRAVELED (MILLIONS OF MILES); UNITED STATES 1990 - 2000

YEAR	TOTAL VEHICLE MILES TRAVELED	% CHANGE
1990	2,144,362	2.3%
1991	2,172,047	1.3%
1992	2,250,150	3.5%
1993	2,296,378	2.1%
1994	2,357,589	2.7%
1995	2,422,819	2.8%
1996	2,485,846	2.6%
1997	2,560,375	3.0%
1998	2,625,367	2.5%
1999	2,691,336	2.5%
2000	2,688,315	-0.1%

Source: BEBR 2002

APPENDIX 6

Petroleum Statistics

PETROLEUM QUICK STATS

US Crude Oil Production	5,801,000 Barrels/Day
US Crude Oil Imports	9,328,000 Barrels/Day
US Crude Oil Imports from OPEC	4,787,000 Barrels/Day
Top US Crude Oil Supplier	Saudi Arabia – 1,600,000 Barrels/day
US Petroleum Product Imports	2,473,000 Barrels/Day
UP Petroleum Product Imports from OPEC	660,000 Barrels/Day
Top US Total Petroleum Supplier	Canada – 1,786,000 Barrels/Day
US Total Petroleum Exports	971,000 Barrels/Day
US Net Petroleum Imports	10,900,000 Barrels/Day
US Petroleum Consumption *	19,649,000 Barrels/Day
US Dependence on Net Petroleum Imports	54.3%
US Motor Gasoline Consumption *	8,610,000 Barrels/Day
	361.6 Million Gallons / Day
US Proved Reserves of Crude Oil as of December 31, 2000	22,045 Million barrels
US Strategic Petroleum Reserve	550 Million Barrels

Source: US Energy Information Administration, US Department of Energy, 2001

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Cornerstone Report 2003

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