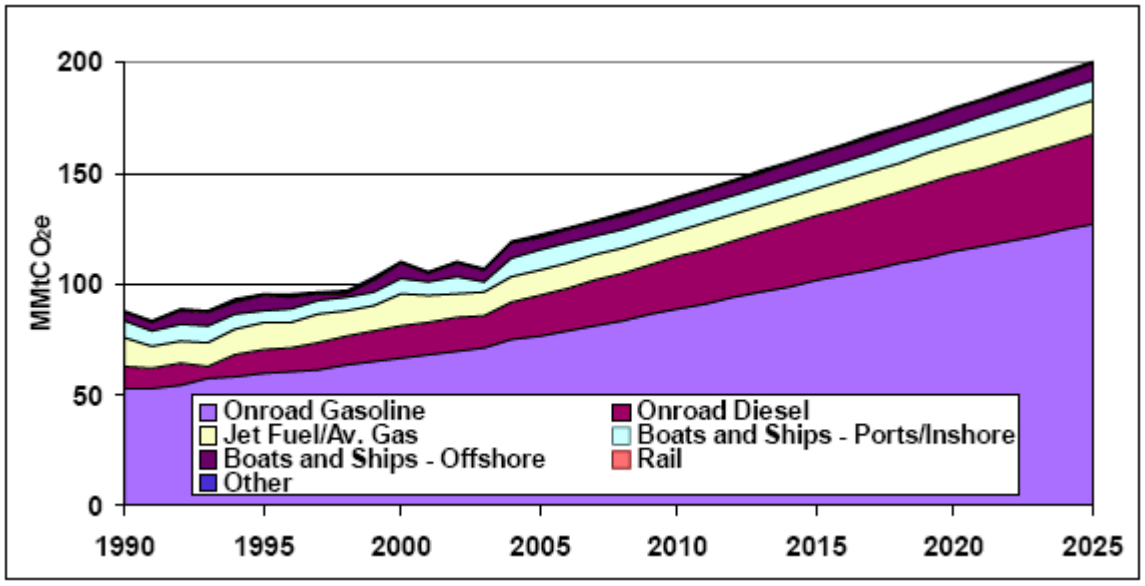
Chapter 5
Transportation and Land Use Sectors

Overview of Greenhouse Gas Emissions

The transportation sector is a primary contributor to Florida's gross greenhouse gas (GHG) emissions. In 2005, the sector accounted for 37 percent, or about 122 million metric tons of carbon dioxide equivalent ($MMtCO_2e$), of Florida's gross GHG emissions. Emissions from the sector increased by 34 $MMtCO_2e$ between 1990 and 2005. Transportation's share of total GHG emissions has increased slightly over this period, accounting for about 41 percent of the state's net growth in gross GHG emissions.

Figure 5-1 and Table 5-1 show historic and projected transportation GHG emissions by fuel and source. As shown in the figure and table, on-road gasoline vehicles account for the largest share of transportation emissions—about 63 percent in 2005. On-road diesel vehicles account for another 15 percent of emissions, and marine vessels account for roughly 12 percent. Air travel, rail, and other sources produce the remaining emissions.

Figure 5-1. Transportation Gross GHG Emissions by Fuel, 1990–2025



Source: Florida Inventory and Reference Case Projection, October 2008.

Table 5-1. Historic and Projected Gross GHG Emissions from Transportation ($MMtCO_2e$)

Source	1990	1995	2000	2005	2010	2015	2020	2025
Onroad Gasoline	52.89	59.46	66.64	76.22	88.70	101.50	114.30	126.68
Automobiles	*34.14*	*33.88*	*37.03*	*41.24*	*48.59*	*56.05*	*63.38*	*70.36*
Light-Duty Trucks	*17.03*	*23.80*	*27.86*	*33.06*	*38.08*	*43.24*	*48.46*	*53.51*
Heavy-Duty Trucks/Buses	*1.64*	*1.68*	*1.64*	*1.80*	*1.90*	*2.05*	*2.28*	*2.60*
Motorcycles	*0.09*	*0.10*	*0.11*	*0.12*	*0.14*	*0.16*	*0.18*	*0.20*
Onroad Diesel	9.73	11.03	13.99	18.28	23.48	28.84	34.37	40.72
Automobiles	*0.27*	*0.21*	*0.19*	*0.19*	*0.23*	*0.32*	*0.44*	*0.64*
Light-Duty Trucks	*0.44*	*0.62*	*0.84*	*1.00*	*1.33*	*1.81*	*2.50*	*3.60*
Heavy-Duty Trucks/Buses	*9.01*	*10.19*	*12.95*	*17.10*	*21.92*	*26.71*	*31.43*	*36.48*
Jet Fuel/Aviation Gas	13.23	11.60	14.48	11.48	11.70	12.71	13.87	15.26
Boats and Ships - Ports/Inshore	7.19	5.97	6.96	9.01	8.08	8.45	8.83	9.21
Boats and Ships - Offshore	3.88	6.63	7.42	5.89	6.25	6.61	6.97	7.33
Rail	0.31	0.68	0.28	0.58	0.58	0.58	0.58	0.58
Other	0.39	0.37	0.41	0.38	0.41	0.44	0.46	0.49
Total	**87.62**	**95.76**	**110.18**	**121.84**	**139.19**	**159.13**	**179.37**	**200.26**

Source: Florida Inventory and Reference Case Projection, October 2008.

As a result of Florida's population and economic growth and an increase in total vehicle miles traveled (VMT), on-road gasoline consumption grew by 44 percent between 1990 and 2005. Meanwhile, on-road diesel use rose by 88 percent during that period, suggesting an even more rapid growth in freight movement within or across the state. In the absence of significant increases in vehicle fuel economy, on-road gasoline and diesel emissions are expected to continue to grow at roughly historical rates to 2025. Total transportation emissions are projected to grow by 64 percent, or 78 $MMtC0_2e$, between 2005 and 2025.

The U.S. Energy Independence and Security Act of 2007 contains a provision to increase the corporate average fuel economy (CAFE) of light-duty vehicles (passenger cars and light trucks) to 35 miles per gallon by 2020. The Florida Inventory and Reference Case Projection discussed above does not include the CAFE or biofuels provisions (or any other provisions) of the Energy Independence and Security Act of 2007. Increases in vehicle fuel economy resulting from this Act will lead to reduced CO_2 emissions from onroad vehicles. The effect of the new CAFE standards was accounted for in the estimates of GHG reductions from the various transportation and land use (TLU) policy recommendations discussed below.

Key Challenges and Opportunities

Florida has substantial opportunities to reduce GHG emissions from transportation sources. The principal means to reduce GHG emissions from transportation and land use (TLU) are:

- Improving vehicle fuel efficiency;
- Substituting gasoline and diesel with lower-emission fuels; and
- Reducing total VMT.

In Florida and in the nation as a whole, vehicle fuel efficiency has improved little since the late 1980s, yet many studies have documented the potential for substantial increases in efficiency while maintaining vehicle size and performance. Automobile manufacturers typically oppose dramatic increases in fuel economy. Key points of contention include the cost to manufacturers and cost to consumers. Even with the adoption of the new federal CAFE requirements, there may still be opportunities for further increases in fuel efficiency while maintaining vehicle size and performance.

The use of fuels with lower per-mile GHG emissions could achieve larger market penetration in Florida. Conventional gasoline- and diesel-fired vehicles can use low-level blends of biofuels. Alternative-technology vehicles can also use higher-level blends, as well as other types of alternative fuels, such as natural gas and hydrogen. The type of fuel used is a crucial determinant of impact on GHG emissions, as some alternative fuels have relatively little GHG benefit. Alternative fuels from biomass, cellulosic residues, and energy crops have been identified by the U.S. Department of Agriculture (USDA) and the U.S. Department of Energy (US DOE) as the best near-term opportunity to reduce oil dependence and GHG emissions.

Key determinants of the possible impact to GHG emissions will be the development and deployment of fuel types. At present, fuel distribution infrastructure is a constraining factor. Existing federal legislation and the 2006 Florida Energy Act provide incentives in the form of income and sales tax credits for investments in the production, storage, and distribution of biodiesel and ethanol. However, the Florida credits terminate on June 30, 2010, and are subject to relatively low statewide caps on the amount of credits allowable.

Reducing VMT is crucial to mitigating GHG emissions from transportation. Developing smarter land-use and transportation development patterns that reduce trip length and support transit, ridesharing, biking, and walking can contribute substantially to this goal. A variety of pricing policies and incentive packages can also help to reduce VMT. Developing better planning methods and regulations, and increasing funding of multiple modes of transportation will be key components in achieving these goals.

Overview of Policy Recommendations and Estimated Impacts

The Florida Governor's Action Team on Energy and Climate Change (Action Team) recommends a set of seven policies for the TLU sector that offer the potential for major economic benefits and emission savings. Implementing these policy recommendations could lead to emission reductions of:

- 12.73 MMtCO2e annual reductions in 2025, and
- 57.53 MMtCO2e cumulative savings from 2009 through 2025.

The weighted-average cost of the recommended policies is -$86/MtCO2e, for the policies whose cost was quantified. This average value includes policies whose individual cost-effectiveness ranges from a net savings of about $142/MtCO2e to a cost of $2/MtCO2e. The estimated impacts of the individual policies are shown in Table 5-2.

The policies recommended by the Action Team are described briefly here and in more detail in Appendix C of this report. The recommendations not only could result in significant GHG emission reductions, but offer a host of additional benefits as well. These benefits include reduced local air pollution, more livable/healthier communities, and economic development and job growth from in-state biofuel production. To yield the levels of savings described here, the recommended policies need to be implemented in a timely, aggressive, and thorough manner.

Low-GHG fuels (TLU-1) and improved transportation system management (TLU-4) are important components of the recommended policies. Transportation fuel providers would need to undertake changes in their production and distribution methods in order to achieve the goals set out in TLU-1. There are feasibility issues associated with transporting large volumes of biofuels to and within the state, as well as distributing biofuels to consumers. For example, ethanol has historically not been moved in the pipeline network used to transport gasoline and diesel fuel. The pipeline industry is currently in the process of adapting technology for pipeline distribution of ethanol. To achieve the goals of TLU-1, the challenges of production and distribution of low-GHG fuels will need to be addressed through this and other means.

TLU-4, taken in concert with other aggressive transportation and land use policy actions, could result in significant reductions to VMT on the order of 7-10 percent in urban areas by 2020. Vehicle hours of travel (VHT) can be reduced by amounts that are associated with these VMT reductions. VHT reduction is recognized as a means of reducing driver delay while also reducing excess fuel consumption in congested traffic.

Several other policies would work with TLU-4 and with each other to further reduce VMT by increasing the viability of multiple modes of travel and providing incentives to use modes other than single-occupant vehicles (SOVs): Smart Growth Planning (TLU-3) and Increasing Choices in Modes of Transportation and Factoring GHG Emissions into TLU Planning Processes (TLU-5 and TLU-6). Smart growth policies are being considered and implemented around the country in a wide range of communities. Because most policies are deregulatory in nature, this significantly lowers political barriers. However, these policies will face several challenges. They require increased coordination between state government, local government, and businesses in many cases. The availability of funding for the provision of additional transit services is uncertain. Also, patterns of development are subject to economic cycles and many private investment decisions. Yet implementation of these policies is essential to make travel by walking, biking, and transit more feasible. Together these policies address the built environment, transportation infrastructure, and the behavior of individuals to reduce per capita VMT.

Table 5-2. Summary of TLU Policy Recommendations

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO2e)	Energy Security Fuel Savings (Gallons Saved 2009–2025) (million gallons)	Level of Support
		2017	2025	Total 2009-2025				
TLU-1	Develop and Expand Low-GHG Fuels	6.20	12.62	106.41	–$15,161	–$142	37,290	Approved
TLU-2	Low Rolling Resistance Tires and Other Add-On Technologies	0.80	1.84	13.99	-$1,259	-$90	1,665	Approved
TLU-3	Smart Growth Planning	Not Quantified Separately; Included in Other Analyses						Approved
TLU-4	Improving Transportation System Management (TSM)	3.94	6.98	63.91	-$5,106	-$80	7,858	Approved
TLU-5&6	Land Use (TLU) Planning Processes and Increasing Choices in Modes of Transportation	1.77	3.54	28.29	NQ	NQ	3,200	Approved
TLU-7	Incentive Programs for Increased Vehicle Fleet Efficiency	0.84	1.56	13.14	NQ	NQ	1,564	Approved
TLU-8	Increasing Freight Movement Efficiencies	0.59	1.10	11.52	$21	$2	1,302	Approved
	Sector Totals	**14.14**	**27.64**	**237.26**	**-$21,505**	**-$91**	**52,879**	
	Sector Total After Adjusting for Overlaps	**12.73**	**25.14**	**214.35**	**-$18,400**	**-$86**	**48,786**	
	Reductions from Recent Actions	**17.68**	**32.39**	**284.00**				
	Sector Total Plus Recent Actions	**30.41**	**57.53**	**498.35**				

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/tCO2e = dollars per metric ton of carbon dioxide equivalent.

Note: The numbering used to denote the above recommended priority policy recommendations is for reference purposes only; it does not reflect prioritization among these important recommended policies.

Florida is currently pursuing adoption of Clean Car standards which would increase fuel economy standards beyond those set by the new Federal CAFE standards. Because these standards are being undertaken as part of the Florida Department of Environmental Protection (DEP) rule making process, they are not included as one of the TLU policy recommendations. The Clean Car standards must clear several hurdles before Florida or any other state can adopt them, including U.S. Environmental Protection Agency (EPA) approval of the original California Clean Car standards (that other states can then opt into). If for any reason Florida is not able to implement the Clean Car standards, other technology-based policy recommendations could play a larger role. For example, Incentive Programs for Increased Vehicle Fleet Efficiency (TLU-7) can encourage consumers to buy the most efficient vehicles

available on the market. Low Rolling Resistance Tires and Other Add-On Technologies (TLU-2) can improve vehicle fuel economy through vehicle operation and maintenance practices. Other policies, such as Increasing Freight Movement Efficiencies (TLU-8), can promote technological improvements in the heavy-duty vehicle fleet.

Transportation and Land Use Policy Descriptions

The policy recommendations described briefly here could not only result in significant GHG emission reductions and cost savings but also offer a host of additional benefits, such as reduced local air pollution; more livable/healthier communities; and increased transportation choices. Appendix C of this report discusses these policies in more detail.

TLU-1. Develop and Expand Low-GHG Fuels

This recommendation seeks to reduce GHG emissions by decreasing the carbon intensity of vehicle fuels sold in Florida. A low-carbon fuel standard (LCFS) would require all fuel providers in Florida to ensure that the mix of fuel they sell into the Florida market meets, on average, a declining standard for GHG emissions measured in carbon dioxide equivalent (CO_2e) per unit of fuel energy. The state should develop, with industry and stakeholder input, a set of standards for low-carbon fuels, which include biodiesel, cellulosic ethanol, hydrogen, compressed natural gas, liquefied petroleum gas, electricity, and low-carbon blends such as E10 or E85. The standard would be measured on a life cycle basis in order to include all emissions from fuel production to consumption.

Fuel providers (defined as refiners, importers, and blenders of on-road vehicle fuels) will need to report on an annual basis that the fuel mixtures they provide to the market meet the LCFS. Fuel retailers should be encouraged to provide this information to consumers at the point of sale to the extent that the information is available.

TLU-2. Low Rolling Resistance Tires and Other Add-On Technologies

The goal of this policy is to improve the fuel economy of the light-duty vehicle (LDV) fleet by reducing the rolling resistance of replacement tires without reducing tire lifetime or otherwise increasing the lifecycle carbon footprint of the tires. There are three avenues by which the rolling resistance of tires may be reduced, and fuel economy improved as a result:

- Consumers could purchase more tires that are now available and have lower rolling resistance.
- Tire designs could be modified and new technologies could be introduced to reduce rolling resistance.

- Vehicle operations could be improved, especially through improved maintenance of tire inflation.

Currently, tire manufacturers and retailers are not required to provide information about the fuel efficiency of replacement tires. In addition, there is no current minimum standard for fuel efficiency that all replacement tires must meet. State policy and action can help bridge this gap through a variety of mechanisms. The state could set minimum energy efficiency standards for replacement tires and require that greater information about Low Rolling Resistance replacement tires be made available to consumers at the point of sale. Information can also be provided to consumers about fuel efficiency and cost in relation to the purchase, maintenance, and operation of their vehicles. The state could encourage or provide information on complementary add-on technologies that could facilitate vehicle operation practices that improve fuel efficiency. One example of these technologies is devices such as the Air Alert Valve Caps which alert the vehicle owner when tire pressure is too low.

TLU-3. Smart Growth Planning

Smart growth planning looks at how land use planning, site planning, and urban design at the community level can help achieve carbon and GHG emission reduction goals. The essence and intention of smart growth within the context of climate change is to establish a policy framework, clear guidelines, and measurement parameters for the development of new (and the redevelopment of older) communities that will have a net-zero-carbon effect on the general environment and reduce overall GHG emissions. This can be accomplished through the complex interactions of the three primary elements of community development that have a direct impact on GHG emissions and affect climate change:

- Construction energy and building lifetime energy use—measured by the protocols of Leadership in Energy and Environmental Design (LEED™) Green Building Rating System, Green Globes, or the Florida Green Building Coalition (FGBC);
- Individual VMT generation and other transportation energy use (e.g., deliveries, maintenance, buses, security, health, fire, and safety) necessary to support human communities; and
- The changing of land uses from carbon-sequestering land uses (e.g., forests, agriculture, parks, and wetlands) to carbon-releasing land uses (e.g., building sites and roadways) and development patterns.

This policy aims to bring about reductions in GHG emissions through smart growth planning. The state could achieve this by providing incentives and promoting redevelopment projects that establish more energy-efficient land use patterns. Redevelopment should result in a mix of uses that result in a reduction of VMT when compared with the existing land use pattern. The state could also maximize opportunities to retrofit existing buildings to meet LEED, Green Globes,

FGBC, or other approved certification programs to reduce energy consumption and thus reduce GHG emissions.

TLU-4. Improving Transportation System Management (TSM)

Transportation System Management (TSM) is the concept of pairing transportation demand with transportation supply to help transportation networks serve the demand in an effective and efficient manner. Effective system management may utilize a variety of strategies based on advanced technologies, market-based incentives, regulations, and design standards. Each strategy provides a relatively small benefit to GHG reduction, but when applied in concert, substantial gains can be achieved.

TSM strategies attempt to reduce the number of trips being taken by single-occupant vehicles (SOVs), shorten trip lengths, reduce vehicle delay, increase the reliability of the transportation network, and reduce idling and other transportation actions that result in increased GHG emissions. The goal of TSM is to reduce the daily VMT per capita on the transportation network. Effective TSM will also reduce VHT per capita, which measures the amount of traffic congestion delay. Reduction of either VMT or VHT is highly correlated with a reduction in GHG emission.

The state could develop and implement a variety of policies and strategies to reduce GHG emissions through TSM. These policies and strategies could include program funding, financial and development incentives, infrastructure investment, and regulatory requirements to promote transportation system management improvements that result in reduced VMT and/or VHT which, in turn, result in reduced GHG emissions. These actions, taken in concert with other aggressive transportation and land use policy actions, should be designed to reduce urban area VMT by 7 percent–10 percent by 2020 and by 9 percent–12 percent by 2050; VHT can be reduced by amounts that are associated with these VMT reductions. VHT reduction is recognized as a means of reducing driver delay while also reducing excess fuel consumption in congested traffic.

TLU-5/6. Land Use (TLU) Planning Processes and Increasing Choices in Modes of Transportation

This policy seeks to ensure that local and state land use and transportation planning consider the impact of land use and transportation decisions on the reduction of GHG emissions. This policy also aims to double transit ridership; to increase the percentage of people that walk, bicycle, carpool, vanpool, or telecommute; and to develop and implement policies and strategies that include program funding and financial incentives that expand non-automobile infrastructure and provide modal alternatives to SOV travel.

TLU-7. Incentive Programs for Increased Vehicle Fleet Efficiency

Florida can reduce its GHG emissions by improving the fuel economy of the LDV fleet. This recommendation includes several policies and programs to encourage the purchase of low-GHG-emission vehicles through monetary and convenience rewards and incentives throughout the state:

- Tax credits for efficient vehicles.
- Incentive programs for major corporate fleet owners, including rental car and taxi companies.
- CO_2-based registration fees and vehicle licensing fees.
- Procurement of efficient fleet vehicles (public, private, or other).
- Study of feebates.
- Operating incentives for low-GHG vehicles.
- CO_2-based excise taxes.
- CO_2-based product labeling

TLU-8. Increasing Freight Movement Efficiencies

This policy recommendation aims to reduce the trucking industry's carbon footprint and GHG emissions, while maintaining the current level of service to the state and nation, and encouraging the development and expansion of intermodal and long-distance rail capacity to support both local and transcontinental rail service into and out of Florida. The U.S. Department of Transportation's (US DOT's) Federal Highway Administration (FHWA) lists two major categories of emissions-reducing strategies that Florida can utilize in these goals:

- Technical strategies, which modify a piece of equipment or its fuel to reduce emissions; and
- Operational strategies, which change the way a piece of equipment is used, resulting in lower emissions.