

a report on

FLORIDA TRANSPORTATION TRENDS AND CONDITIONS



IMPACT OF TRANSPORTATION
Transportation and the Environment



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Table of Contents and List of Tables and Figures

Table of Contents

Introduction	1
Energy	1
Air Quality	4
Reducing Emissions from Transportation	7
Ecology	8
Water and Wetlands	12
Noise	13
Other Impacts on the Physical Environment	14
Impacts on Human Environment	15
Native American Coordination	16
Historical Sites	18
Conclusion	21
References	22
Appendix A	23

Table of Contents and List of Tables and Figures

List of Figures

Figure 1 – Energy Consumption in Florida by Sector, 2000 – 2011	2
Figure 2 – Florida and U.S. per Capita Annual Energy Consumption by Sector, 2011	2
Figure 3 – Energy Consumption in Florida by Source, 2000 – 2011	3
Figure 4 – Petroleum Energy Consumption in Florida, 1995 – 2006	4
Figure 5-- GHG Emissions, VMT, and population in Florida (1990 – 2007)	6
Figure 6 – Emissions Sources of GHG in U.S.	7
Figure 7 – Florida Managed Areas - Sensitive Lands	9
Figure 8 – Florida Historic Structures	18

List of Figures

Table 1 - State and National Ambient Air Quality Standards	5
Table 2– Examples of Reduction Opportunities in the Transportation Sector	8
Table 3 – Selected Ecology related data available from Florida Geographic Data Library	10
Table 4 – Right of Way Parcels Acquired (Non-Turnpike)	14
Table 5 - Recycled Asphalt Pavement 2004-2013	15

Impact of Transportation: Transportation and the Environment

Introduction

Florida governments are faced with often conflicting public policy objectives of providing transportation facilities, supporting economic development, and preserving our natural resources. Our transportation system exists to satisfy the needs of residents and visitors to travel from place to place, and the needs of businesses to move their products between markets. However, providing that mobility has environmental consequences. Responding to the challenges of population growth and a growing economy creates pressures on energy supplies, air quality, water supply and quality, wetlands, and wildlife habitats. The challenge is to provide transportation infrastructure and services in a manner that minimizes environmental consequences. Accomplishing this involves a host of actions ranging from optimizing the productivity of travel through transportation network and land use design to following responsible practices in the construction and operation of transportation.

Transportation has direct impacts on both the human and the natural environment resulting from vehicles and their byproducts, and from transportation infrastructure such as roads and parking. Transportation investments can have indirect impacts by affecting development patterns, which can subsequently affect the environment. This report provides information on several of the environmental impacts of transportation. The environment also affects the provision of transportation as the planning and design process considers environmental issues. Project design, location, cost, prioritization, and implementation are influenced by environmental considerations. Over the past few decades, environmental issues such as encroachment on wetlands, disturbances to wildlife habitats, and impacts on communities have been factors in the provision of transportation and often are critical to project selection and public positions on various transportation investments. Redesigns and delays of transportation projects across the country can often be traced to conflicts and difficulties associated with resolving environmental issues.

This report covers energy, air quality, ecology, water and wetlands, noise, and the human environment impacts of transportation.

Energy

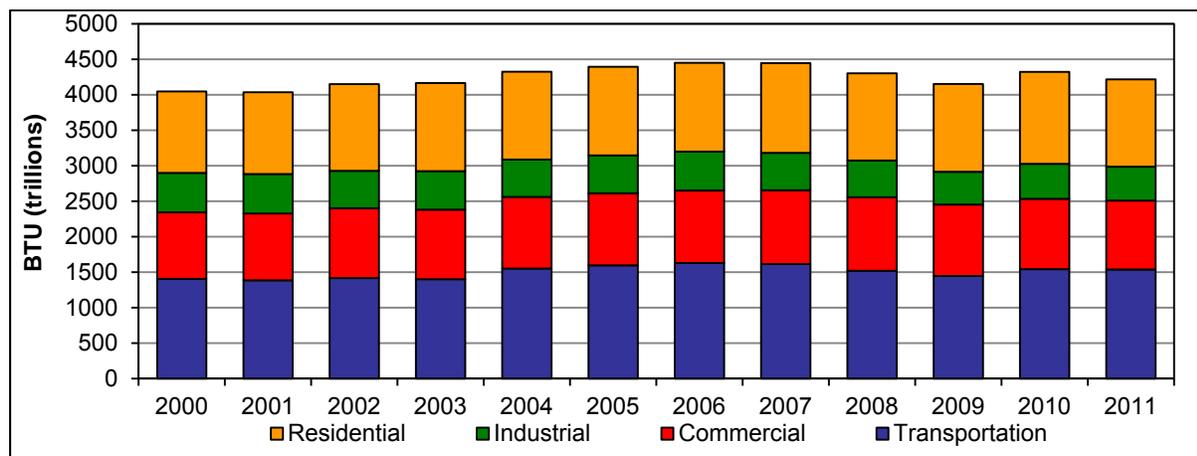
As shown in Figure 1, Florida's consumption of energy increased until the 2006 – 2007 timeframe then declined slightly through the recession, with 2011 energy consumption remaining below peak levels. Energy consumption by transportation peaked in 2006 at 1,630 trillion BTUs then moderated by 11 percent before slightly rebounding in 2010 and 2011.

Florida ranked 3rd in the amount of energy use for transportation in 2011, behind California and Texas.

Impact of Transportation: Transportation and the Environment

Florida, the fourth most populous state, ranks third in the United States in energy use for transportation. California and Texas, two of the larger states, each consume considerably more transportation energy than does Florida. However, use levels in Florida exceed New York, the third most populous state. Florida is only slightly smaller but New York only consumes approximately 2/3 as much transportation energy as does Florida. More details on state level transportation consumption by energy category are shown in Appendix A.

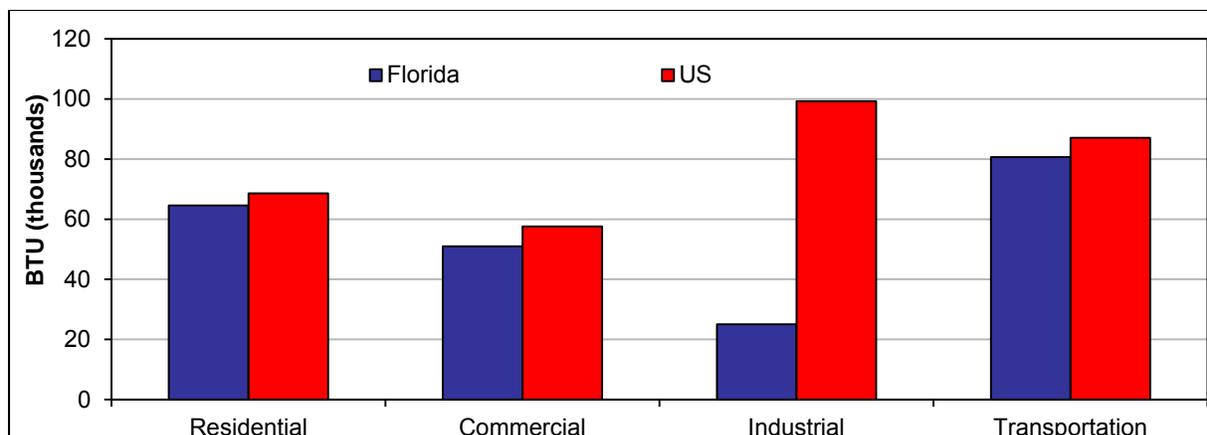
Figure 1 – Energy Consumption in Florida by Sector, 2000 – 2011



Source: Energy Information Administration

When examined on a per capita basis, the average Floridian's energy consumption follows a pattern similar to the nation except in the industrial category. Florida maintains a generally service-oriented economy with significantly less industrial economic activity compared to other segments of the country. Additionally, Floridians use slightly less energy per capita than U.S. residents for all other purposes.

Figure 2 – Florida and U.S. per Capita Annual Energy Consumption by Sector, 2011

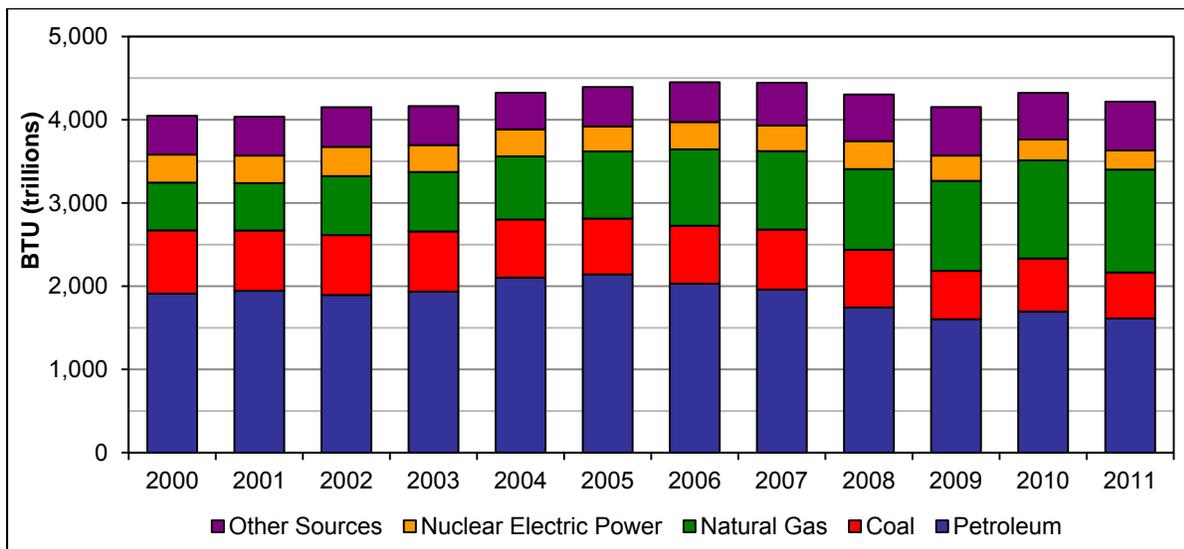


Source: Energy Information Administration, American Community Survey, 2011

Florida's industrial energy consumption is about one quarter of the Nation's average energy consumption.

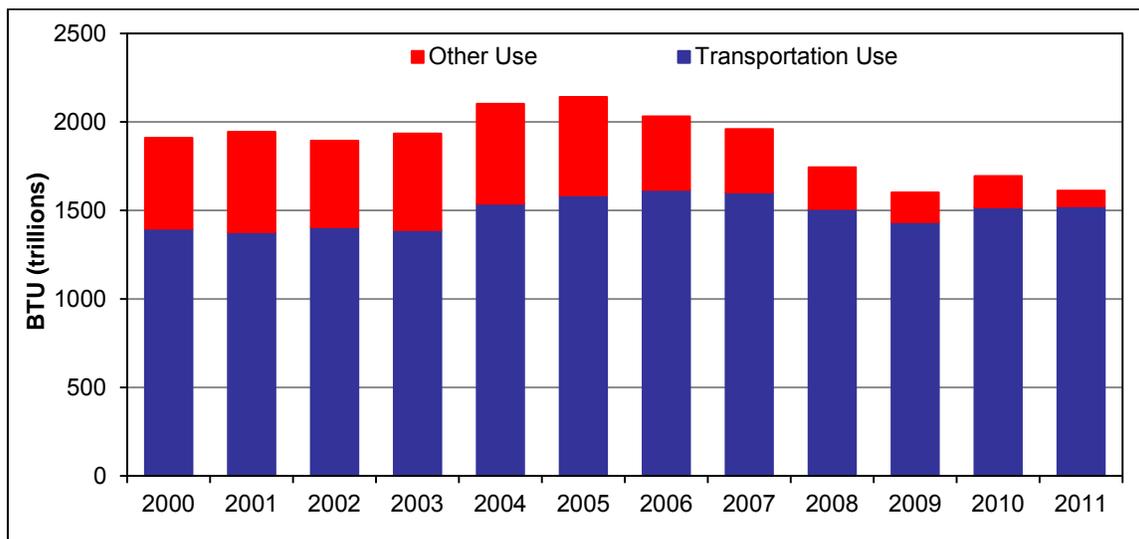
Figure 3 indicates that both petroleum and coal use has evidently declined since 2005. Natural gas is the principal replacement source. Nuclear energy use has declined over the past decade whereas other sources have increased slightly. As noted previously, total energy use remains below peak levels in 2006.

Figure 3 – Energy Consumption in Florida by Source, 2000 – 2011



Source: Energy Information Administration

Figure 4 – Petroleum Energy Consumption in Florida, 2000 – 2011



Source: Energy Information Administration

Impact of Transportation: Transportation and the Environment

Figure 4 shows the trend in overall petroleum energy consumption in Florida and the growing dominance of transportation as the consumer of petroleum energy. Both total petroleum energy use and transportation petroleum energy use are below peak levels in 2005. Transportation's share of energy use has gone from 74 percent in 2005 to 94 percent in 2011. The absolute decline in transportation energy use reflects declining VMT, particularly truck VMT, and improved fuel efficiency of vehicles. The declines in other uses of petroleum energy reflect primarily conversion of oil fueled electrical generation capacity.

Petroleum is Florida's number 1 energy source. Transportation uses 94 Percent of the petroleum consumed in Florida.

Air Quality

Transportation related emissions are a major factor in air quality and, hence, air quality assessment is tied closely to transportation policy and planning. The State of Florida Air Quality Monitoring Program provides the public and units of local, state, and federal government with measurements of pollutant concentration levels in the ambient air (Ambient air is generally defined as that portion of the atmosphere near ground level and external to buildings or other structures). Legal limitations on pollutant concentration levels allowed to occur in the ambient air, or ambient air quality standards, have been established by the U.S. Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (DEP) for six pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particle pollution (10 microns or less in diameter (PM₁₀) and 2.5 microns or less in diameter (PM_{2.5})), and sulfur dioxide (SO₂). Since health-based criteria have been used to establish the standards, these six pollutants are referred to as 'criteria air pollutants'.

All areas within the state are designated with respect to each of the six pollutants as: attainment (i.e., in compliance with the standards); non-attainment (i.e., not in compliance with the standards); or unclassifiable (i.e., insufficient data to classify). Attainment areas can be further classified as maintenance areas. Maintenance areas are areas previously classified as non-attainment, which have successfully reduced air pollutant concentrations to below the standard, but must maintain some of the non-attainment area plans to stay in compliance with the standards. The purpose of the non-attainment designation is to identify air quality problem areas for which the DEP and the EPA must seek solutions.

Six criteria pollutants are monitored – carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide and particulate matter.

Impact of Transportation: Transportation and the Environment

State and National Ambient Air Quality Standards govern determination of air quality attainment (Table 1). For more detail on national standards see <http://www.epa.gov/air/criteria.html>.

Table 1 - State and National Ambient Air Quality Standards

Pollutant	Averaging Time	Florida Standard	Primary NAAQS	Secondary NAAQS
Carbon Monoxide	8-hour ^a	9 ppm	9 ppm	-
	1-hour ^a	35 ppm	35 ppm	-
Lead	Quarterly ^b	1.5 µg/m ³	1.5 µg/m ³	1.5 µg/m ³
	3-Month ^b	0.15 µg/m ³	0.15 µg/m ³	0.15 µg/m ³
Nitrogen Dioxide	Annual ^c	0.05 ppm	0.053 ppm	0.053 ppm
	1-hour ^d	-	100 ppb	-
Ozone	1-hour	0.12 ppm	-	-
	8-hour ^e	-	0.075 ppm	0.075 ppm
Particulate Matter (PM ₁₀)	24-hour ^f	150 µg/m ³	150 µg/m ³	150 µg/m ³
Particulate Matter (PM _{2.5})	Annual ^g	-	15.0 µg/m ³	15.0 µg/m ³
	24-hour ^d	-	35 µg/m ³	35 µg/m ³
Sulfur Dioxide	3-hour ^a	0.5 ppm	-	0.5 ppm
	1-hour ^h	-	75 ppb	-

¹ Source: Florida Department of Environmental Protection, Air Monitoring Report for 2011.

a – Not to be exceeded more than once per year.

b – Not to be exceeded.

c – Annual mean.

d – 98th percentile, averaged over three years.

e – Annual 4th highest daily maximum 8-hour concentration, averaged over three years.

f – Not to be exceeded more than once per year on average over three years.

g – Annual mean, averaged over three years.

h – 99th percentile of 1-hour daily maximum concentrations, averaged over three years.

All areas of Florida are now attainment areas. Orange County; Duval County; the Tampa Bay area including Hillsborough and Pinellas Counties; and Southeast Florida including Miami-Dade, Broward, and Palm Beach Counties continue to be classified by the Environmental Protection Agency as attainment/maintenance areas for the pollutant ozone and a portion of Hillsborough County is a maintenance area for lead.

The entire state remains designated as unclassifiable for PM₁₀. This classification is a form of attainment. Ambient air data are collected by 206 monitors in 37 counties throughout the state. The most current measures of performance air monitoring reports are available at:

http://www.dep.state.fl.us/air/air_quality/techrpt/amr.htm.

One element of air quality that has gotten increasing attention over the past several years is that associated with carbon and other greenhouse gas emissions. These emissions increase carbon dioxide levels in the atmosphere and scientists indicate this as a contributing factor to increased warming. Florida's geography and coastal setting make it uniquely vulnerable to the impacts of higher temperatures and higher sea levels. Adverse impacts could include loss of land; damages to infrastructure such as roads and bridges, and other structures; loss of wildlife habitat; accelerated coastal erosion; exacerbated flooding and increased vulnerability to storm

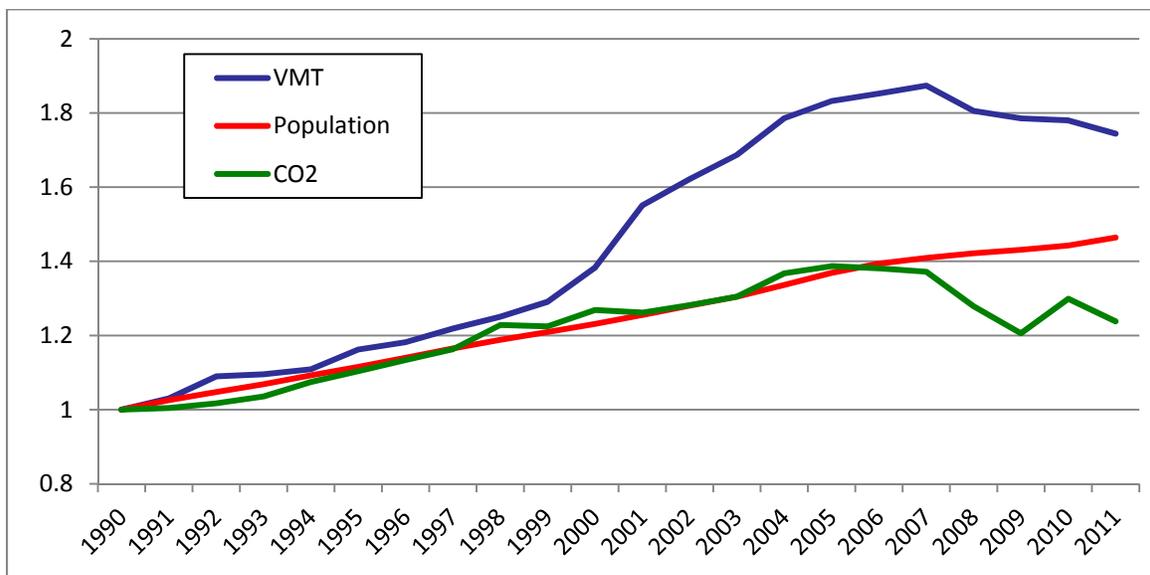
Impact of Transportation: Transportation and the Environment

damage; and increased salinity of rivers, bays, and aquifers, which would threaten supplies of fresh water.

Historic trends of greenhouse gas emissions nationally peaked in the early 2000's and have declined for several years with current estimated emissions being approximately similar to those in the mid-1990s.

The most current available data for Florida for carbon dioxide emissions is shown in Figure 5. The data indicate that Florida also had peak emissions in 2005 with declines in subsequent years excluding 2010. This graphic also shows the relative trends of carbon dioxide emissions, vehicle miles of travel (VMT), and population. Carbon dioxide levels have moderated reflecting changes in VMT but also capturing other effects including vehicle energy efficiencies and gradual conversion of power generation to less carbon dioxide intensive fuels.

Figure 5—Carbon Dioxide Emissions, VMT, and Population in Florida (1990-2011)

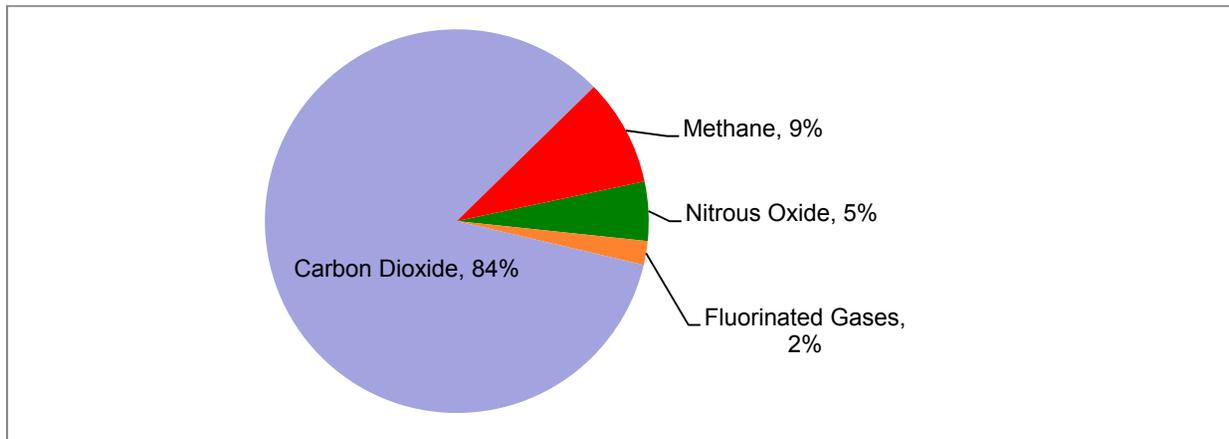


Notes: Normalized to 1990 Values

Source: EPA, FHWA, FDOT

Figure 6 and Figure 7 provide perspective by showing the sources of GHG in the United States first by gaseous emissions type and second by economic sector. Carbon dioxide is the dominant source of GHG emissions and the one that has received the most attention through policy and technology investments specifically vehicle fuel efficiency standards and infrastructure investments to move toward less carbon dioxide intensive natural gas powered power generating capacity.

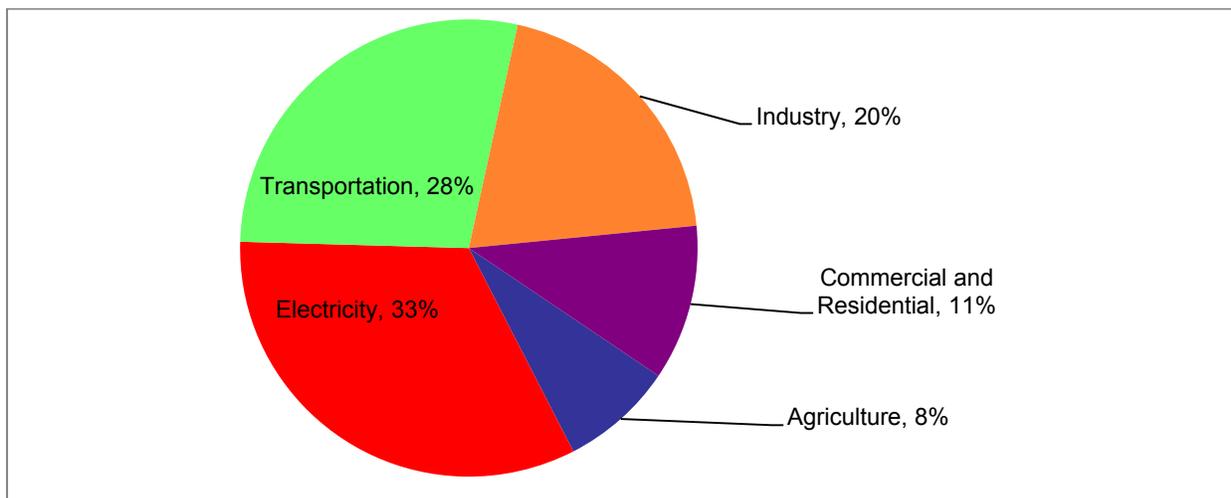
Figure 6 – Emissions Sources of GHG in U.S.



Source: US Environmental Protection Agency

The transportation sector's GHG emissions in Florida are dominated by personal vehicle travel in cars and light trucks.

Figure 7 – Economic Activity Sources of GHG in U.S.



Source: US Environmental Protection Agency

Reducing Emissions from Transportation

There are a variety of opportunities to reduce greenhouse gas emissions associated with transportation. Table 2 from the U.S. EPA categorizes these opportunities and provides examples. Many of these types of initiatives are among those being considered and implemented by individuals, businesses and government entities across Florida.

Impact of Transportation: Transportation and the Environment

Table 2– Examples of Reduction Opportunities in the Transportation Sector

Type	How Emissions are Reduced	Examples
Fuel Switching	Using fuels that emit less CO ₂ than fuels currently being used. Alternative sources can include biofuels; hydrogen; electricity from renewable sources, such as wind and solar; or fossil fuels that are less CO ₂ -intensive than the fuels that they replace. Learn more about Alternative and Renewable Fuels.	<ul style="list-style-type: none"> • Using public buses that are fueled by compressed natural gas rather than gasoline or diesel. • Using electric or hybrid automobiles, provided that the energy is generated from lower-carbon or non-fossil fuels. • Using renewable fuels such as low-carbon biofuels.
Improving Fuel Efficiency with Advanced Design, Materials, and Technologies	Using advanced technologies, design, and materials to develop more fuel-efficient vehicles.	<ul style="list-style-type: none"> • Developing advanced vehicle technologies such as hybrid vehicles and electric vehicles, that can store energy from braking and use it for power later. • Reducing the weight of materials used to build vehicles. • Reducing the aerodynamic resistance of vehicles through better shape design.
Improving Operating Practices	Adopting practices that minimize fuel use. Improving driving practices and vehicle maintenance. Learn about how the freight transportation industry can reduce emissions through EPA's SmartWay Program.	<ul style="list-style-type: none"> • Reducing the average taxi time for aircraft. • Driving sensibly (avoiding rapid acceleration and braking, observing the speed limit). • Reducing engine-idling. • Improved voyage planning for ships, such as through improved weather routing, to increase fuel efficiency.
Reducing Travel Demand	Employing urban planning to reduce the number of miles that people drive each day. Learn about EPA's Smart Growth Program. Reducing the need for driving through travel efficiency measures such as commuter, biking, and pedestrian programs. See a list of links to state, local, regional travel-efficiency programs.	<ul style="list-style-type: none"> • Building public transportation, sidewalks, and bike paths to increase lower-emission transportation choices. • Zoning for mixed use areas, so that residences, schools, stores, and businesses are close together, reducing the need for driving.

Source: US Environmental Protection Agency

Ecology

People, animals, plants, land, and water exist together in ecosystems; each relies

on the other parts of the whole. Understanding the relationships between the parts of the whole is important to maintaining a balance within the ecosystem. Transportation projects can significantly impact many aspects of the environment including wildlife and their habitats,

A balanced ecosystem is very important for the coexistence of people, animals, plants, land, and water.

Impact of Transportation: Transportation and the Environment

wetlands, and groundwater resources. In situations where impacts cannot be completely avoided or minimized, mitigation or conservation efforts are required.

Figure 8 is an example of information that is available from the Florida Geographic Data Library (FGDL) at the GeoPlan Center at the University of Florida. It depicts Conservation Lands in the database. Shoreline sensitivity data provides information relevant to shoreline habitat and oil spill planning and response in addition to other environmental management purposes. Florida wildlife refuges and conservation areas depicted are just some of the key environmental boundaries managed by agencies in Florida.

Figure 8 – Florida Managed Areas - Sensitive Lands



Source: Florida Geographic Data Library, 2013

Impact of Transportation: Transportation and the Environment

The GeoPlan Center at the University of Florida, with the assistance of FDOT, FDEP and others has developed the “Florida Geographic Data Library” (FGDL) to make information in numerous databases more available, easily understood, and uniform. New data are continuously added and updated as they become available. Statewide and county data are available from the FGDL for many other types of information. The FGDL database consists of over 500 vector datasets, 900 satellite images, and 16,000 digital orthophoto quarter quads and over 100,000 aerial photographs from various sources. This data is an important resource used throughout the department to support and inform transportation decisions. Table 3 is a partial list. A complete list can be obtained from GeoPlan or the FGDL website (www.fgdl.org).

Table 3 – Selected Ecology related data available from Florida Geographic Data Library

<i>Data File</i>	<i>Source</i>	<i>Type</i>	<i>Year</i>
Public Pinelands - 2011	Florida Natural Areas Inventor (FNAI) and All Water Management Districts	STATE	2011
Potential Habitat Richness	Florida Fish and Wildlife Conservation Commission (FFWCC)	STATE	2009
Priority Wetlands Habitats	Florida Fish and Wildlife Conservation Commission (FFWCC)	STATE	2012
Florida Aquatic Preserve Boundaries	Florida Department of Environmental Protection	STATE	2011
Florida National Estuarine Research Reserves	National Oceanic and Atmospheric Administration (NOAA)	STATE	2011
Wastewater Facilities	Florida Department of Environmental Protection	STATE	2013
Florida Vegetation Map - 1967	University of Florida, GeoPlan Center	STATE	1967
Florida Managed Areas – March 2013	Florida Natural Areas Inventory	STATE	2013
Florida’s Environmentally Sensitive Shorelines	Florida Fish and Wildlife Conservation Commission- Fish and Wildlife Research Institute	STATE	2003
Solid Waste Facilities	Florida Department of Environmental Protection,	STATE	2013
Florida’s Artificial Reefs	Florida Fish and Wildlife Conservation Commission (FWC), Division of Marine Fisheries Management (DMF)	STATE	2011
Florida Invasive Plants	Florida Natural Areas Inventory	STATE	2010
National Marine Sanctuary Areas	NOAA Coastal Services Center	STATE	2004
Ambient Air Monitoring Sites	Florida Department of Environmental Protection (FDEP)	STATE	2011
Florida State Parks	Fish and Wildlife Research Institute	STATE	2011
Florida National Wildlife Refuges	National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center (CSC)	STATE	2010
Hazardous Waste Facilities	Florida Department Environmental Protection	STATE	2013
Strategic Habitat and Conservation Areas	Florida Fish & Wildlife Conservation Commission	STATE	2009
Principle Aquifers of Florida	United States Geological Survey	STATE	2003

Source: Florida Geographic Data Library, 2013

Impact of Transportation: Transportation and the Environment

With 123 species listed as threatened or endangered, Florida is only behind Hawaii, California, and Alabama in the number of such animals and plants. Complete descriptions of plants and animals listed in Florida can be found at the U.S. Fish and Wildlife Service's Threatened and Endangered Species System website.

FDOT coordinates with federal and other state agencies in order to connect and streamline the environmental process and permitting. The ETDM process is the product of such an initiative.

All state transportation projects meet federal and state water, noise, air quality, and natural resource standards. But the successful protection and mitigation of impacts on the quality of the air, water, wetlands, habitats of endangered species, and other environmental assets calls for a more integrated, flexible approach than just meeting legal standards.

The department coordinates with other state and federal agencies in order to connect and streamline the environmental process and permitting. This includes the establishment of the Efficient Transportation Decision Making (ETDM) process. The purpose of the ETDM process is to incorporate environmental considerations into transportation planning to inform project delivery helping to preserve and enhance Florida's natural, physical, cultural and social environment as we develop, implement, and maintain transportation facilities and services. The ETDM process provides agency experts and the public the opportunity for early input and identification of environmental considerations to inform the planning, project development, and permitting process in order to expedite activities and approvals. Other department initiatives address specific concerns:

- The construction and use of some transportation projects can significantly impact wildlife habitats, including those of endangered species. Where impacts cannot be avoided or minimized, mitigation or conservation efforts are required. Informational signing and reducing speed limits to provide safer passage and connectivity for wildlife are effective options in some instances. Where this is not feasible, the department has purchased habitats important to animals such as the Florida panther and black bear and constructed structures such as wildlife crossings. In conjunction with the wetlands mitigation program, Water Management Districts can purchase, restore, and manage larger habitats for wildlife.
- Greenways are corridors of protected open space that are managed for conservation and recreation. They connect natural preserves, parks, cultural and historic sites, and in some cases, populated areas. The department participates in the statewide greenways program and provides funding through its Transportation Alternatives Program.

Impact of Transportation: Transportation and the Environment

- Historically, roadsides on state highways were managed to prevent roadway erosion and enhance travel safety. Now, roadside vegetation is being planted and managed to conserve energy, protect ground water, reduce storm water runoff, increase and improve wildlife habitat, eliminate invasive species, enhance aesthetics, and improve relationships with neighbors. Recent strategies include increased emphasis on conservation, restoration, and management of natural areas, re-establishment and management of native plants, prescribed burns, and application of composted materials.

No state east of the Mississippi River consumes more fresh water than Florida. Drinking water for over 90 percent of Florida's population is supplied by ground water sources that are highly susceptible to contamination from sources such as landfills, leaking underground storage tanks, urban storm water, etc.

Water and Wetlands

No state east of the Mississippi River consumes more fresh water than Florida, according to U.S. Geological Survey estimates. Drinking water for over 90 percent of Florida's population is supplied by ground water sources. Florida's ground water resources are highly susceptible to contamination from sources such as landfills, leaking underground storage tanks, urban stormwater, etc. Oil, gasoline, and metals from roads and parking lots and sediment from erosion contribute to problems with stormwater runoff. FDOT works with the FDEP to identify methods to reduce sediment from erosion, particularly during project construction, and to reduce road-related pollutants in stormwater runoff by the construction of detention and retention ponds along state highways.

Wetlands serve as flood storage areas where water can spread out without damage to developed uplands. They filter pollutants that are assimilated by plants and soil. They stabilize shorelines preventing erosion. Wetlands also produce the basic food material used by aquatic life, and serve as nursery grounds for fish and rookeries for birds. FDOT provides mitigation for unavoidable wetland impacts through a variety of mechanisms which satisfy federal and state requirements. FDOT can mitigate for wetland impacts by purchasing mitigation credits from mitigation banks, funding the FDEP and the Water Management Districts to develop a mitigation plan to mitigate for project impacts and designing and constructing mitigation itself. The mitigation provided is coordinated with the appropriate regulatory agencies and replaces the functional value of the wetlands impacted by transportation projects.

While traditionally responsible for wetlands mitigation for highway construction impacts, FDOT has the flexibility to mitigate through any option that meets federal and state requirements.

Impact of Transportation: Transportation and the Environment

Noise

Noise, defined as unwanted or excessive sound, can be annoying and may cause physical and psychological damage. Noise can be disruptive to our lives by interfering with sleep, work, recreation, and even our conversations. Transportation noise is one of the most difficult problems to avoid in today's society. A major component of the transportation noise problem is highway traffic noise. Highway traffic noise is an important issue for communities across the United States.

The National Environmental Policy Act (NEPA) of 1969 requires that adverse environmental effects, including highway traffic noise, be evaluated and mitigated on federal-aid projects. NEPA requires the federal government to use all practical means and measures to promote general welfare and foster a healthy environment. The Federal Highway Administration (FHWA) regulations for mitigation of highway noise in the planning and design of federally aided highways are contained in Title 23 of the Code of Federal Regulations Part 772 (23 CFR 772). The regulations require identification of traffic noise impacts, examination of potential mitigation measures, incorporation of reasonable and feasible noise mitigation measures into the highway project, and coordination with local officials to provide helpful information on compatible land use planning and control.

Transportation noise is one of the most difficult problems to avoid in today's society. Highway traffic noise is an important issue for communities across the United States.

Document 23 CFR 772 contains noise abatement criteria that represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations require that every reasonable and feasible effort be made to provide noise mitigation when the criteria are approached or exceeded. Florida has defined "approached" as noise levels within 1 decibel (dBA) of the FHWA abatement criteria. Abatement is also required when noise levels are predicted to substantially exceed existing noise levels even when they do not exceed the abatement criteria. Florida has defined "substantially exceed" as exceeding existing noise levels by 15 dBA.

Florida Statute 335.17 (1989), "State highway construction, means of noise abatement", requires FDOT to make use of noise control methods in the construction of state highways, in particular those located in or near urban residential developments. The statute also requires that highway projects, *regardless of funding source*, be developed in conformity with the federal standards contained in 23 CFR 772. The department's "Noise Abatement" Policy (Topic No. 000-360-005 –d) reflects the requirements of the statute. These requirements are implemented through Part 2, Chapter 17 "Noise" of the department's Project Development and Environment (PD&E) Manual.

Impact of Transportation: Transportation and the Environment

If noise impacts are identified on a project, various noise abatement measures are considered as mitigation. These may include traffic management measures, creating buffer zones, highway relocation, or the construction of sound barrier walls. In Florida, the most prevalent method is the use of sound barriers. Since the 1970's most sound barriers in Florida have consisted of the department's standard concrete sound barrier design.

The issue of providing reasonable mitigation for noise impacts deals with the cost of providing the noise attenuation. Reasonableness is expressed in terms of the cost of the sound barrier per benefited receiver. In Florida, the maximum cost has been set at \$42,000 per benefited receiver.

In Florida, the cost of sound barriers has been going up steadily over time. However, the latest data shows a decline in the cost per square foot of noise barriers reflecting the recent more competitive contracting environment and declines in material prices. The average cost in the last two years is around \$20.00 per square foot, down from approximately \$30.00 per square foot in 2006. Florida has completed approximately 14 million square feet of noise barriers at a total cost exceeding \$430 million.

Other Impacts on the Physical Environment

Transportation impacts various other aspects of the physical environment by its physical presence. While there is not a standardized database across all modes and all levels of government and the private sectors that are involved in the provision of transportation, some select information is provided below to exemplify impacts.

Land Consumption

As roadways expand to accommodate new transportation needs, additional land is purchased to use for transportation facilities. FDOT tracks the number of parcels of right of way it acquires annually. Table 4 reports ROW parcels for recent years. Actual land area information, while a better measure of impact, is not readily available.

Table 4 – Right of Way Parcels Acquired (Non-Turnpike)

<i>Fiscal Year</i>	<i>ROW Parcels Including Voided Parcels</i>
2002-2003	2,042
2003-2004	1,613
2004-2005	1,429
2005-2006	1,118
2006-2007	1,002
2007-2008	954
2008-2009	930
2009-2010	711
2010-2011	686
2011-2012	1,159
2012-2013	1,071

Source: FDOT

Impact of Transportation: Transportation and the Environment

Recycled Materials

Roadway construction and reconstruction is increasingly turning to recycled materials for both cost and environmental benefits. The estimated amount of recycled asphalt pavement used in the past 10 years has almost doubled (Table 5). Steel, concrete, fill and other materials are occasionally recycled in the numerous construction projects underway annually to build and maintain the roadway system.

Table 5 - Recycled Asphalt Pavement 2004-2013

Fiscal Year (Jul - Jun)	RAP (tons)
2004-2005	569,137
2005-2006	833,672
2006-2007	890,371
2007-2008	807,374
2008-2009	699,925
2009-2010	684,969
2010-2011	765,307
2011-2012	834,772
2012-2013	940,616

Source: FDOT

Impacts on Human Environment

FDOT is the “caretaker” of much of Florida’s vast transportation system, but nothing that the department does is without impact to users, visitors, residents, communities, property owners and other agencies. The impacts on citizens, communities, cultural resources, and the environment must be a consideration in all transportation investment decisions and the design and construction of transportation improvements.

For many years, FDOT has conducted activities to assess the impact of its decisions on communities and public outreach to involve people in the decisions that might affect their quality of life.

Impacts on people and their communities can include:

- Social Effects – community cohesion, changes in demographics, employment issues, and quality of life
- Economic Effects – business/employment, travel patterns, traffic levels, business visibility, and tax base
- Land Use – infill development, sprawl/misdirected growth, condemnation blight, and effects on the centers of community activity
- Mobility – accessibility for pedestrians, transit and transportation disadvantaged, intermodal connectivity, and public parking
- Aesthetics – noise, vibration, scenic views, and community aesthetics
- Relocation Effects – residential, business, and public facilities

For many years, FDOT has conducted activities to assess the impact of its decisions on communities and public outreach to involve people in the decisions that might affect their quality

Impact of Transportation: Transportation and the Environment

of life. During transportation planning, the department is required to conduct public hearings for its Long Range Transportation Plan and for Work Program activities. In the Project Development and Environmental (PD&E) process, districts conduct extensive public involvement activities for the preparation of federally-required environmental documents. During design, project engineers consider design adaptations based on community desires through Transportation Design for Livable Communities. When a project is under construction, districts reach out to the business and residential communities through Community Awareness Plans.

Throughout the ETDM process, potential impacts to the human environment are identified and considered alongside those to the natural environment beginning in the planning phase and continuing through project development. Data contained in the Florida Geographic Data Library provides statistical information about population, income, neighborhood boundaries, location of schools, health facilities, EMS facilities, transit routes and more. This information, combined with local information and public input, allows the department to screen potential projects for their possible impacts on communities.

Native American Coordination

Native Americans have inhabited Florida for over 12,000 years. Their camps, villages, stone quarries, burial grounds, and ceremonial centers comprise the vast majority of the 26,000 archaeological sites recorded in the state. These known sites represent only a small portion of those that exist and have yet to be located and recorded. Section 106 of the National Historic Preservation Act of 1966 and its implementing regulations, 36 CFR Part 800, require that federal agencies consult with appropriate federally recognized Native American tribes when an undertaking may have the potential to affect Native American sites on or off tribal lands. In the case of transportation projects, the Federal Highway Administration (FHWA) and its principal partner, the Florida Department of Transportation, act together to fulfill this obligation.

If transportation projects might have an impact on a Native American site, on or off tribal lands, FHWA and FDOT act together to fulfill the obligation to consult with appropriate federally recognized Native American tribes.

Consultation with Native American tribes occurred sporadically over the past two decades, usually associated with specific transportation projects adjacent to tribal lands. An expansion of this effort began in 1998 with formal meetings in Tallahassee, including FHWA and department staff, concerning revisions to 36 CFR Part 800 that were in progress. Representatives from two tribes in Florida participated in these meetings and provided information on tribal history and Native American issues involving transportation. The revisions to the regulations, effective January 2001, led to a formalization of the consultation process and increased interaction between agencies and tribes.

Impact of Transportation: Transportation and the Environment

In Florida, consultation concerning the potential impacts of transportation projects on Native American sites involves six federally recognized tribes:

- The Miccosukee Tribe of Indians of Florida
- The Muscogee Creek Nation of Oklahoma
- The Poarch Band of Creek Indians of Alabama
- The Seminole Tribe of Florida
- The Seminole Nation of Oklahoma
- Mississippi Band of Choctaw Indians

All six tribes have ancestral lands throughout the southeastern United States. The Miccosukee and Seminole Tribes of Florida currently reside in and have tribal lands within the state. The other tribes at one time inhabited the state and thus have direct cultural affiliation with Florida. In the future, as communication with Native American tribes expands, other federally recognized tribes culturally affiliated with Florida are expected to join in the consultation process.

FHWA and the department, in association with the State Historic Preservation Officer, Department of State, held a series of formal meetings with representatives of the above tribes in 2002. The objectives of the meetings were to establish partnerships between participating agencies and tribes, increase cultural awareness among all parties, and identify key issues important to all concerning transportation. The key issues identified in these meetings include:

- Establishing effective communication channels
- Establishing appropriate communication protocols
- Enhancing mutual respect and understanding between participating parties
- Understanding the roles and responsibilities of agencies and tribes under historic preservation law
- Understanding agency concerns for meeting transportation needs of the state
- Understanding tribal concerns for Native American sacred and cultural resources
- Streamlining the consultation process

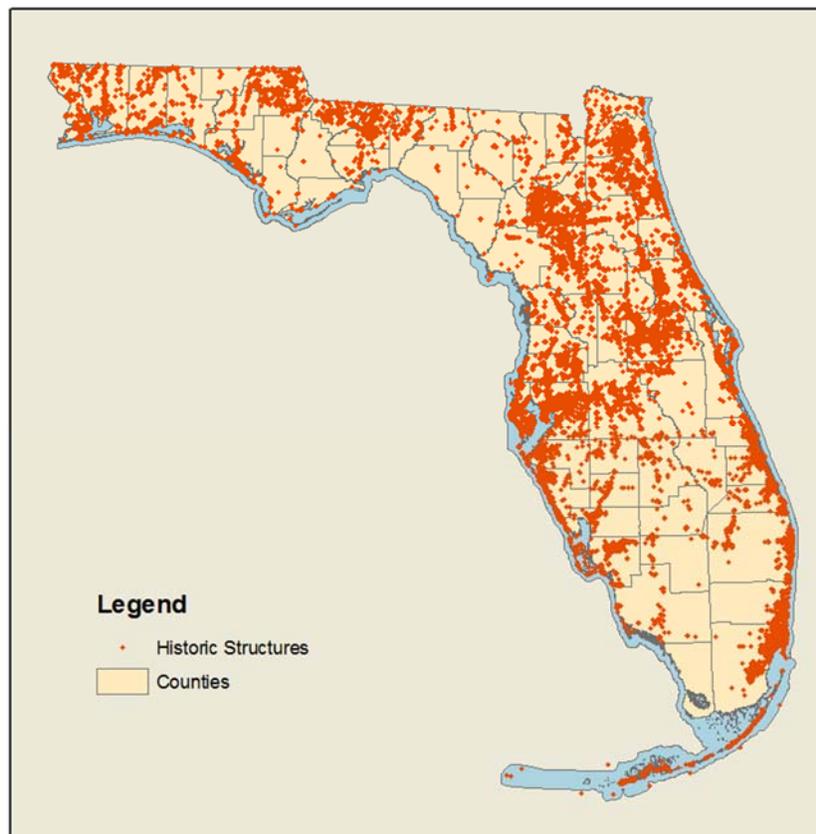
The ultimate goal of these meetings and the dialogue that continue today is to develop and implement a Memorandum of Understanding between agencies and tribes that will ensure compliance with historic preservation law, streamline the consultation process, and ensure that the concerns of all are taken into consideration in the development and implementation of transportation projects.

FDOT recognizes the importance of sustaining the rich cultural heritage of Florida while meeting its goal to provide for the efficient transportation of people and goods in our state.

Historical Sites

The Florida Department of Transportation recognizes the importance of sustaining the rich cultural heritage of Florida while meeting its goal to provide for the efficient transportation of people and goods in our state. We realize the importance of historic properties as integral parts of the lives of Florida citizens and the importance of these resources to the tourist industry and economy of the state. The department works closely with its principal partner, the Federal Highway Administration, to identify and protect significant historic properties such as archaeological sites, buildings, and bridges potentially impacted by transportation projects. Other federal and state agencies, the State Historic Preservation Officer (SHPO), Native American Tribes, local governments, advocacy groups, and the general public also participate in this effort. The department has developed and implemented a strong Cultural Resource Management (CRM) program to comply with federal and state historic preservation laws, rules, and regulations and other pertinent legislation while pursuing its transportation objectives.

Figure 9 – Florida Historic Structures



Source: Florida Geographic Data Library, 20013

Impact of Transportation: Transportation and the Environment

The Florida Master Site File, managed by the Division of Historical Resources, Department of State, maintains records on over 190,000 historical and archeological sites and structures in the state. Figure 9 displays nearly 155,000 historic structures as of 2013. Historical sites may include such structures as vintage homes or government buildings or even cemeteries. These numbers represent only a small portion of the actual cultural resources that exist in Florida and that remain unidentified and unrecorded. The location and basic information on recorded resources have been entered into a Geographic Information System database in the Florida Geographic Data Library managed by GeoPlan at the University of Florida. Figure 9 portrays these sites across Florida.

The department bases its CRM program on Section 106 of the National Historic Preservation Act of 1966 (as amended) and its implementing regulations, 36 CFR Part 800, entitled “Protection of Historic Properties” along with Florida’s Historical Resources Act. The National Historic Preservation Act established the *National Register of Historic Places (NRHP)*, a listing of the historic buildings, sites, districts, structures, and objects that are significant in American history, archaeology, culture, or engineering. Section 106 requires that federal agencies and their agents, such as the department, “take into account” the effects that any undertaking may have on significant cultural resources listed in or eligible for listing in the *NRHP*. The Florida Historical Resources Act (Chapter 267, Florida Statutes) mirrors the requirements of Section 106 for State agencies. The National Environmental Policy Act of 1969 and the U.S. Transportation Act of 1966 also influence department decisions regarding cultural resources. Finally, the Native American Graves Protection and Repatriation Act of 1990 and Chapter 872 Florida Statutes (Offenses Concerning Dead Bodies and Graves), provide requirements for the proper treatment of human remains and funerary objects that may be impacted by transportation projects.

The department utilizes the four-step Section 106 process in addressing a transportation project’s potential for impacting significant cultural resources. These four steps are to initiate the Section 106 process, identify historic properties, assess adverse effects, and resolve these effects.

Step 1 consists of determining whether the proposed undertaking is a type of action that could affect historic properties if they exist in the area of potential effect for the project. If it is determined that the project has the potential to affect historic properties, the SHPO, appropriate Native American Tribes, and other agencies or organizations and citizens are identified as consulting parties concerning the action.

Step 2 requires the completion of a cultural resource assessment survey to identify historic properties near the project. This survey also includes evaluations of the significance of these resources. If significant historic properties are identified which the project could impact, then

Impact of Transportation: Transportation and the Environment

these impacts must be evaluated and minimized, avoided or mitigated in a sensitive manner and without undermining the purpose of the road project.

Step 3, therefore, consists of assessing these effects to significant historic properties in consultation with appropriate parties to determine if they represent adverse effects to the historic property. Adverse effects are those that may alter, directly or indirectly, any of the characteristics of the resource that qualify it for inclusion in the *National Register*.

In its preservation and compliance efforts, the department seeks to incorporate the need to protect the diverse archaeological and historical resources of the state into our goal of meeting the transportation needs of Florida's residents and visitors

If no historic properties are determined to be adversely affected, then the project may proceed without any further involvement under these historic preservation laws.

Step 4 requires that if adverse effects are identified, consultation takes place to resolve these adverse effects by avoidance, minimization, and/or mitigation. Consultation may result in a Memorandum of Agreement (MOA) among involved parties. The MOA outlines the measures to be taken to resolve the adverse effects to the resource in order for the project to proceed. Occasionally, no amount of mitigation or minimization will leave the historic resources intact. In these cases, the effects are weighed in relation to the transportation purposes of the project and the effects are accepted in the public interest in order for the project to proceed.

In addition to ensuring the consideration of the State's important historic characteristics and sites in the development and delivery of department projects, the department maintains an inventory and evaluation of historically important components of the Florida transportation system. These elements often represent focal points of Florida communities, such as the Sunshine Skyway in the Tampa Bay area or the Main Street Bridge in Jacksonville. Others serve as heritage tourism destinations like the Bridge of Lions in St. Augustine or the Overseas Highway Bridges in the Keys. In 2005, the department, in consultation with the Division of Historical Resources and the Florida Division of the Federal Highway Administration designated 4 historic elements of Florida's Interstate Highways as significant historic sites. These included:

1. The Snake Wall at the Paynes Prairie rest stop on I-75 as a unique solution to minimizing dangers to wildlife and the traveling public,
2. The Sunshine Skyway as a major engineering achievement,
3. Alligator Alley, or I-75, across the Everglades of South Florida as an early example of a major transportation corridor designed and engineered to accommodate the functions of the lands it crossed and the transportation needs of the state, and
4. The unusual metal through-arch overpass on I-95 in Jacksonville as a rare example of an important bridge type

Impact of Transportation: Transportation and the Environment

In this same area of responsibility, the department recently updated its inventory and assessments of the State's historic highway bridges. This effort involved a review and analysis of over 4,000 historic bridges and a field inspection of 590. Among these bridges, the surveyors identified 166 which appear to meet the qualifications for historic significance. By completing this analysis, the department is able to better plan and deliver its bridge replacement and rehabilitation projects. In 2012, the department used the findings of this bridge study to eliminate future historic evaluations for over 8000 bridges of common types. This represents an incredible savings in time and financial resources without sacrificing any historic resources of importance to the communities and the visitors in our state. The department's Cultural Resource Management program is broad and effective. In its preservation and compliance efforts, the department seeks to incorporate the need to protect the diverse archaeological and historical resources of the state into our goal of meeting the transportation needs of Florida's residents and visitors; not only because the FDOT is charged with both, but because both our roadways and our historic resources give Floridians a sense of value and place and both the resources and the roads stimulate tourism and economic development for our future.

Conclusion

Environmental considerations permeate the provision of transportation at all levels ranging from the macro considerations such as the impact of transportation on climate change and the cohesiveness of communities, to the consequences of mode investment priorities and network configurations on land development patterns to the impact of a specific investment of the habitat of a given parcel of land. Concerns about the environment are critical considerations in all aspects of project development and implementation and very much influence the public's attitudes toward transportation.

Transportation providers are tasked with the challenge of providing safe and efficient transportation systems that support community visions and enable the personal mobility and economic activity that enhance our quality of life while still sustaining the human and natural environment and resources. These considerations are likely to continue to be critical and challenging elements of transportation policy and investment. Environmental protection is destined to be an ongoing priority for local, state, and federal transportation initiatives.

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Appendices

Appendix A

Table C8. Transportation Sector Energy Consumption Estimates, 2011 (Trillion Btu)

State	Coal	Natural Gas ^a	Aviation Gasoline	Distillate Fuel Oil	Jet Fuel b	Petroleum					Total	Retail Electricity		Electrical System Energy Losses ^e	Total
						LPG ^c	Lubricants	Motor Gasoline ^d	Residual Fuel Oil	Sales		Net Energy			
Alabama	0	23.5	0.4	124.4	13.4	0.3	2.3	316.3	6.7	463.7	0	487.2	0	487.2	
Alaska	0	3.5	0.8	44.4	118.2	(s)	0.4	32.9	0.4	197.2	0	200.7	0	200.7	
Arizona	0	15.6	1	111.3	21.5	0.8	1.6	318.2	0	454.5	0	470.1	0	470.1	
Arkansas	0	11.5	0.4	99.7	5.9	0.4	2	171.3	0	279.8	(s)	291.2	(s)	291.2	
California	0	25.7	1.9	440.9	549.7	3.8	13.3	1,770.10	186.9	2,966.50	2.8	2,995.10	5.5	3,000.50	
Colorado	0	14.7	0.6	83.2	58.3	0.3	1.9	257.4	0	401.7	0.2	416.6	0.4	416.9	
Connecticut	0	6.5	0.4	39.9	8.8	0.3	1.2	178.2	0.4	229.2	0.6	236.3	1.1	237.4	
Delaware	0	0.5	0.3	8.4	0.5	(s)	0.3	52.1	(s)	61.7	0	62.2	0	62.2	
Dist. of Col.	0	2.7	(s)	2.3	0	(s)	0.3	13	0	15.6	1.1	19.4	2.5	21.9	
Florida	0	13.9	2.3	221	202.5	1	3.8	1,007.70	84.9	1,523.30	0.3	1,537.40	0.5	1,538.00	
Georgia	0	11.7	0.6	184.8	99.3	1.3	2.9	574.4	67.1	930.5	0.6	942.8	1.2	944	
Hawaii	0	(s)	0.2	19.8	62.1	0.1	0.4	57.2	6.3	146	0	146	0	146	
Idaho	0	5.4	0.4	41.2	3.6	0.2	0.7	80.3	0	126.3	0	131.7	0	131.7	
Illinois	0	22.4	0.6	227.7	144.3	2	7.2	569.3	0	951	1.8	975.1	4	979.1	
Indiana	0	10.4	0.5	190.1	51.2	0.9	3.3	363.7	1.3	611	0.1	621.5	0.2	621.7	
Iowa	0	10.9	0.3	99.1	3.8	0.8	2.5	195.5	0	301.9	0	312.9	0	312.9	
Kansas	0	23.7	0.8	79.5	16.7	0.3	2.9	156.3	0	256.4	0	280.2	0	280.2	
Kentucky	0	12.5	0.2	137	56.3	0.6	2.4	263	0	459.5	0	472	0	472	
Louisiana	0	54	0.5	195.6	107.6	0.2	3.4	277.8	83.4	668.6	(s)	722.7	0.1	722.7	
Maine	0	2.5	0.3	27.4	7.3	0.1	0.6	81.5	3.4	120.5	0	123	0	123	
Maryland	0	6.4	0.2	79.1	15.3	0.3	1.5	323.8	1.6	421.8	1.9	430.1	4.2	434.3	
Massachusetts	0	5.6	0.3	67.2	39.7	0.1	2.2	338.2	1.3	449	1.2	455.9	2.1	458	
Michigan	0	24.2	0.6	123.4	18.2	1.4	7	544.9	2.1	697.6	(s)	721.7	(s)	721.8	
Minnesota	0	15.4	0.5	102.2	53.1	0.5	3.8	295.8	0.9	456.8	0.1	472.3	0.1	472.4	
Mississippi	0	29.2	0.3	94.3	35.1	0.2	1.5	193.8	5.5	330.7	0	359.9	0	359.9	
Missouri	0	7.1	0.5	154.7	20	1.2	4.4	379.3	0	560	0.1	567.2	0.2	567.4	
Montana	0	7	0.2	46.1	5.2	(s)	0.9	59.5	0	112	0	119	0	119	
Nebraska	0	9.4	0.2	87.5	4.7	0.1	1.6	99.2	0	193.4	0	202.8	0	202.8	
Nevada	0	5.2	0.3	42.1	17.3	0.2	0.4	131.7	0	192.1	(s)	197.3	(s)	197.4	
New Hampshire	0	0.2	0.1	13.6	3.5	(s)	0.3	85.6	0	103.2	0	103.4	0	103.4	
New Jersey	0	5.9	0.4	138.3	253.4	0.3	3.4	510.2	41.6	947.6	1.1	954.6	2.2	956.8	
New Mexico	0	7.6	0.2	72.2	7	0.2	1	115.1	0	195.8	0	203.4	0	203.4	
New York	0	21.5	0.2	165.7	87.6	0.7	5	671.9	32.4	963.7	10.2	995.4	19.7	1,015.00	
North Carolina	0	7.5	0.7	145.6	10.2	5.2	3	528.6	1.8	695.1	(s)	702.5	0.1	702.6	
North Dakota	0	14.6	0.2	47.6	5.8	0.2	0.7	49.1	0	103.7	0	118.3	0	118.3	
Ohio	0	14.6	0.7	245.1	75.7	1.2	6.7	604.2	0	933.6	0.1	948.3	0.3	948.6	
Oklahoma	0	32.1	0.9	160	46.7	0.4	3.7	219	0	430.7	0	462.8	0	462.8	
Oregon	0	5.4	0.7	90.6	25.5	0.7	2.5	178.7	5.8	304.4	0.1	309.9	0.2	310	
Pennsylvania	0	51.3	0.6	218.1	46.5	1	6.2	616.9	2.8	892	2.9	946.1	5.8	951.9	
Rhode Island	0	1.1	(s)	9.6	4.3	(s)	0.3	45.4	0.3	59.9	0.1	61.1	0.1	61.2	
South Carolina	0	3.5	0.4	105.3	6.1	0.4	1.2	316.2	16.8	446.4	0	449.9	0	449.9	
South Dakota	0	6.7	0.2	31.1	3.4	0.2	0.7	53.5	0	89.2	0	95.9	0	95.9	
Tennessee	0	11.7	0.6	153.1	69.5	0.9	3.2	388.5	0	615.8	(s)	627.6	(s)	627.6	
Texas	0	91	3.4	717.2	350.4	2.2	9	1,476.90	167	2,726.20	0.2	2,817.50	0.5	2,818.00	
Utah	0	12.1	0.3	73.8	32.7	0.2	0.9	131	0	239	0.1	251.2	0.2	251.5	
Vermont	0	0.1	(s)	9.8	1.3	(s)	0.2	38.9	0	50.3	0	50.4	0	50.4	
Virginia	0	14.4	0.4	147.7	72.4	0.4	2.5	465.5	6.9	695.8	0.6	710.8	1.4	712.3	
Washington	0	7.3	0.9	121.5	92.9	1.1	2.4	323.2	48.8	590.8	(s)	598.2	0.1	598.2	
West Virginia	0	23.3	0.1	42.7	1.1	0.1	1.2	100	0	145.2	(s)	168.5	(s)	168.5	
Wisconsin	0	2.7	0.3	104.3	11.3	1	2.5	302.8	0	422.2	0	424.9	0	424.9	
Wyoming	0	18.5	0.1	52.7	2.3	(s)	0.7	39.4	0	95.3	0	113.8	0	113.8	
United States	0	734.2	27.1	6,039.90	2,949.80	33.9	133.9	16,363.20	776.3	26,324.20	26.2	27,084.60	52.6	27,137.20	

^aTransportation use of natural gas is gas consumed in the operation of pipelines, primarily in compressors, and gas consumed as vehicle fuel.

Where shown, (s) = Value less than 0.05 trillion Btu.

^bIncludes kerosene-type jet fuel only; naphtha-type jet fuel is included in "Industrial Sector, Other Petroleum."

Note: Totals may not equal sum of components due to independent rounding.

^cLiquefied petroleum gases.

Web Page: All data are available at <http://www.eia.gov/state/seds/seds-data-complete.cfm>.

^dIncludes fuel ethanol.

Sources: Data sources, estimation procedures, and assumptions are described in the Technical Notes.

^eIncurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses.

http://www.eia.gov/state/seds/data.cfm?infile=/state/seds/sep_sum/html/sum_btu_tra.html&sid=US