Alternate Financing Sources for Alabama Highways

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16. Abstract

Building and maintaining an effective highway system is important to safeguard the mobility and safety of the traveling public, as well as to support economic growth. Aging infrastructure and the continuing increase in vehicle miles traveled, coupled with increased construction and maintenance costs, place added burdens to already strained transportation funding resources. To make things worse, declining transportation funding is a reality that is faced by most states across the country and is a concern of the Federal Highway Administration.

To address such issues this study investigated both traditional and innovative highway financing options and assessed their potential for securing funding for highway related projects in the near- and long term. Options considered include: a) vehicle mileage road user fee, b) heavy truck road user fee, c) public toll roads, d) private toll roads, e) privatization of highway projects, f) private funding using bonds, g) inspection fees, and h) increase in the fuels tax. For each option, implementation requirements, institutional issues, and anticipated costs and benefits from adoption were identified and assessed. The evaluation of alternative revenue sources performed in this study was based on revenue potential, equity, efficiency, and political acceptability to tax payers and government decision makers.

Based on the comparison of alternative revenue generating options considered, recommendations were offered on financing solutions with the best potential for implementation. The review and evaluation of available options indicated that, for the immediate future, the most desirable solution to funding Alabama's highways with respect to efficiency and effectiveness is to increase the fuel tax to at least $0.27 per gallon. However, as the gasoline tax revenue declines, additional options should be considered and future plans made to implement alternative financing solutions to complement or replace the fuel tax revenue. The most promising options include inspection fees, toll collection, and reallocation of funds generated from vehicle registration fees and title fees.

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Executive Summary

Building and maintaining an effective highway system in Alabama is important to the quality of life of the citizens of the state, as well as the state economy. Financing Alabama's highways is of utmost importance in preserving an effective highway system. Projections of decreased revenue for Alabama's highways come at a time when current revenue sources are already strained. Both traditional and innovative ways need to be considered to secure funding for highway related projects. Currently, the main sources of income for Alabama's Highway Fund, approximately 70 percent, are the gasoline and motor fuels taxes. However, changes to the present system may be needed to account for the projected future increase in fuel efficient vehicles. As the number of these vehicles increases, revenue collected by the state from gas taxes decreases; which may further hinder the ability of the state to finance the construction or maintenance of roadways. Therefore, it is important that the state of Alabama identifies, evaluates, and adopts some alternative financing solutions to ensure sustainability of highway funding.

The objective of this research was to determine alternative and innovative solutions to fund Alabama's highways in the near- and long term. An important tool in determining this information is the collection and study of available literature on the subject of income sources for highway projects in other states and abroad, as well as evaluation of the impact of energy-efficient vehicles on Alabama's highway revenue. Based on the findings in the literature study, several relevant options were considered for their suitability in Alabama. These options included a vehicle mileage road user fee, a heavy truck road user fee, toll roads, privatization of highway projects, inspection fees, and increasing the fuels tax under the current system. Evaluation of alternative revenue sources was based on their revenue potential, equity, efficiency, and political acceptability to the tax payers and government decision makers. Thorough evaluations of alternative revenue sources were completed to provide a recommendation as to whether a radical shift in funding or only slight modifications to the existing system was needed to maintain Alabama's highways.

1.0 Introduction

Both social and economic factors in the State of Alabama are greatly influenced by the condition of the roadways. It is also a fact that Alabama residents love to drive. The vehicle miles traveled (VMT) per capita in 2004 in the state was 12,926 (Federal Highway Administration 1995 – 2004). This rate is the fifth highest in the nation. Alabama also ranks third in the nation for both drivers licenses per capita and miles traveled per dollar of income (American Society of Civil Engineers 2006). It is apparent that an Alabamian's quality of life significantly depends on the individual's freedom to move freely throughout the state. Therefore, it is important that Alabama's highways are kept well-maintained. Additionally, because of the lack of a comprehensive public transportation system, most Alabama residents commute by passenger car each day. Of the over 1.9 million workers in Alabama in 2000, only 4.7 percent did not commute to work in personal vehicles. Of this 4.7 percent, 2.1 percent worked from home, 2.1 walked or used other means, while only 0.5 percent of Alabama's workers used public transportation (United States Department of Transportation 2004). The large number of workers commuting by passenger car each day contributes to a faster deterioration of the roadways.

A considerable number of commercial vehicles travel into and through Alabama on the highway system. In 2002, nearly $128 million worth of freight shipments originated in the state (United States Department of Transportation 2004). This maintaining and improving Alabama's roadways is not only imperative to the way-of-life of Alabama citizens, but it is also a necessity in order to preserve the flow of revenue through the state.

Safety is also an important factor to consider when discussing highway maintenance and construction issues. Maintaining high safety standards on Alabama's highways is a necessity in order to maintain the safest roadways possible. The Federal Highway Administration (FHWA) conducted a 20-year study of road and bridge improvements and determined that these improvements made a large difference in reducing accidents (Norrell 2005). Safety statistics show an average of ten large trucks crash on Alabama highway's each day, causing Alabama to have one of the nation's highest accident rates (Blackledge, *et al.* 2005). Improving the condition of Alabama's roadways could contribute to increased roadway safety. Additionally, certain modes of generating revenue, such as vehicle inspection fees, can lend to increased safety on the roadways. Safety is of utmost importance to roadway users and allocating funding to make our roads safer is a priority for local transportation authorities.

1.1 Importance and Impact of Highway Funding

In planning for the future of transportation, the Alabama Department of Transportation (ALDOT) has four main goals and objectives. These objectives are (a) to ensure system protection, (b) to protect the public and private investments in transportation, (c) to provide a transportation system that is interconnected and supports economic growth and development, and (d) to provide a transportation system that enhances the quality of life for Alabama citizens and preserves the quality of the environment (Alabama Department of Transportation 2000). These goals not only address the quality of life and safety of Alabama citizens, but also protect the environment as well as enhance the economy in the state. Reliable transportation funding is an integral part of reaching and maintaining these goals.

Another important consideration is the relationship between the annual VMT by Alabamians and the gasoline tax revenue. The number of miles traveled annually by individual licensed drivers in the state is increasing, causing more damage to Alabama's roadways. This trend is seen in Figure 1-1. However, as illustrated in Figure 1-2 and Table 1-1 (United State Federal Highway Administration 1995 – 2004), the net gasoline tax receipts per annual VMT of Alabama drivers are decreasing. The increase in the late nineties is a result of historically low gas prices during that time and a reversal of the trend towards purchasing more fuel efficient vehicles (Alabama Department of Transportation 2000).

The problem of insufficient transportation funding is a reality that is not affecting only the State of Alabama. Rather, it is faced by most states across the country and is a concern of FHWA. In 2001, about $125 billion was spent by state and local governments, with federal assistance, on the maintenance and building of the nation's transportation system. Of the $125 billion spent, highway capital projects accounted for about $66 billion, $20 billion of which included federal funding (United States General Accounting Office 2004). Federal highway funding is done mostly through the federal-aid highway program. Motor fuel and other taxes are deposited into the Highway Trust Fund, and the money is then made available to the states through various programs and grants. Compared to 2000 funding, the FHWA estimates that the nation will need to spend 18 percent more, about $76 billion total, each year through 2020 to maintain the highways and bridges of the nation. In addition, the FHWA predicts that 65 percent more than in the year 2000, or around $107 billion, will be needed to improve highways and bridges (United States General Accounting Office 2004).

The government is already facing many budget concerns. It appears that in the years to come, the budget deficits of the state and federal governments will pose even greater challenges to transportation funding. Priority of issues like Social Security and Medicare may be using more of the nation's resources, shifting the burden of funding for highway improvements to state and local agencies. Historically, state and local governments have gradually been forced to invest more in highways than the federal government. For example, between the years of 1982 – 2002,

state and local investment in highways increased 150 percent (from $14.1 billion to $35.7 billion), whereas the federal investment increased only 98 percent (from $15.5 billion to $30.7 billion). Presently, state and local governments are required to finance more of the transportation funding than ever before (United States Government Accountability Office 2004).

Not only are highway revenues decreasing, but the cost of maintaining and building roadways is increasing. Building roads is becoming more expensive and difficult, due to environmental concerns and the increasing costs of land, materials, and labor ("The Road Tolls for Thee" 2004). According to the Bureau of Labor Statistics, highway materials rose 12.6 percent in 2005, which is close to four times the pace of inflation ("Rampant Inflation in Highway Construction Materials Costs in US" 2006).

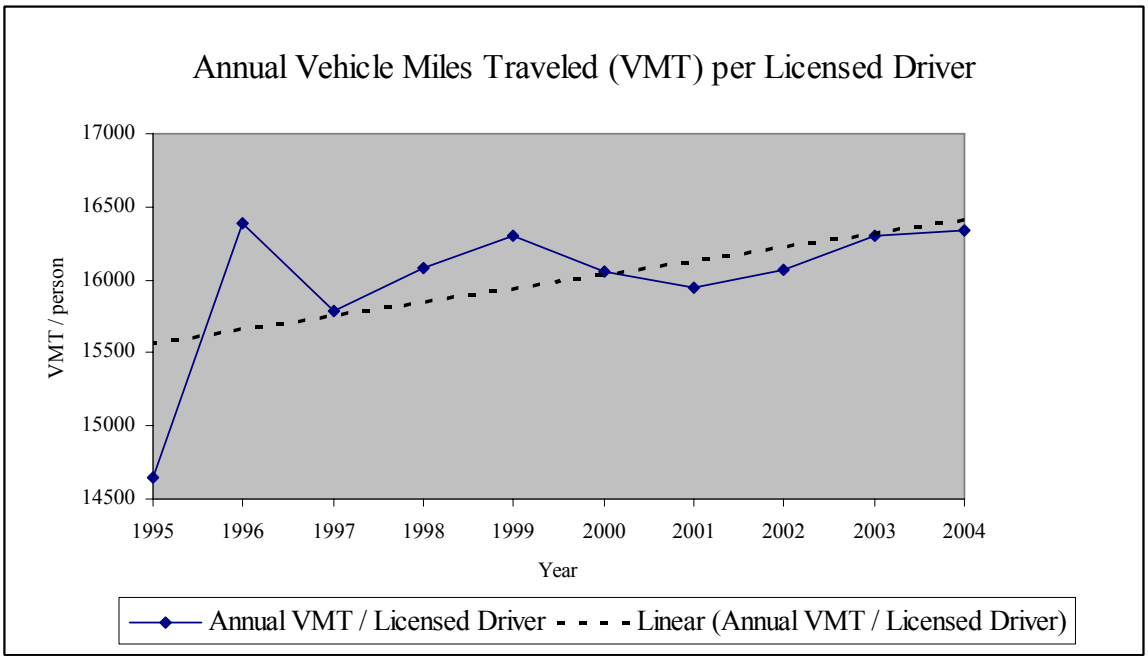

Figure 1-1. Annual VMT per licensed Alabama driver (1995 – 2004)

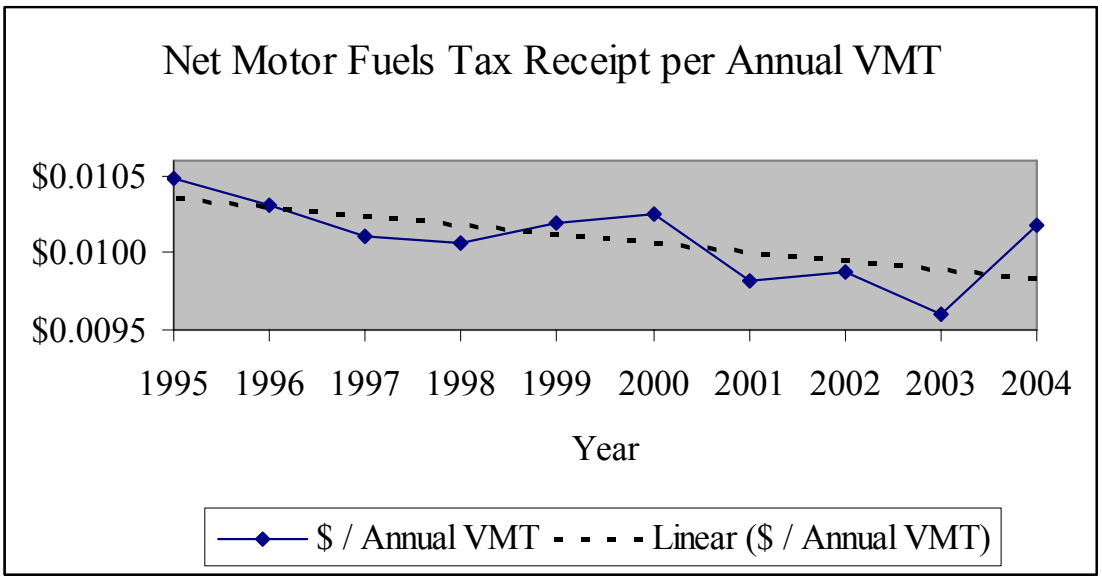

Figure 1-2. Alabama net motor fuels tax receipts per annual vehicle miles traveled (VMT) (1995 – 2004)

Table 1-1. Net gasoline tax receipts per annual VMT (1995 – 2004)

Year	Net Motor-Fuels Tax Receipts[a]	Population[a]	Annual VMT per capita[a]	Net Gasoline Tax Receipts per Annual VMT
2004	$600,596,000	4,567,000	12,926	$0.0102
2003	$563,198,000	4,513,000	12,993	$0.0096
2002	$568,134,000	4,481,000	12,835	$0.0099
2001	$557,464,000	4,457,000	12,737	$0.0098
2000	$579,812,000	4,446,000	12,716	$0.0103
1999	$572,627,000	4,370,000	12,852	$0.0102
1998	$555,347,000	4,352,000	12,685	$0.0101
1997	$540,195,000	4,319,000	12,377	$0.0101
1996	$530,399,000	4,273,000	12,037	$0.0103
1995	$530,779,000	4,253,000	11,904	$0.0105

a – Data from FHWA Highway Statistics[1]
Note: VMT (Vehicle Miles Traveled)

Across the nation, alternative transportation funding methods are being researched and implemented. This is evidenced by the fact that as many as 41 transportation measures, totaling more than $117 billion in new funding over 20 years, appeared on state ballots across the nation in the year 2002 alone (Corless, *et al. 2002)*. Innovative financing solutions are in demand due to

the public's reluctance to increase traditional user fee costs, such as fuel taxes. Although gasoline taxes are an efficient way of generating transportation revenue, the popularity of these fees is declining. Moreover, state gasoline taxes fail to keep up with the pace of inflation (Corless, *et al. 2002)*. According to the Task Force on Transportation Finance in Colorado, the fuel tax has only one-third of the purchasing power it had in the 1960s. This is estimated nationally based on fuel tax revenues, construction costs, inflation, as well as other factors (Colorado Transportation Finance Task Force 2004). This is contributing to the increasing problem of finding funding for supporting the transportation infrastructure. There are not enough of these vehicles in use at the present time to significantly reduce revenues; however, the projected growth in their use could pose a threat to future revenues.

1.2 Hybrid Vehicles and Alternative Fuel Use Impact on Tax Revenue

In the recent years, the introduction of hybrid vehicles and vehicles utilizing alternative fuel is further threatening revenues generated for transportation through gas taxes. Hybrid vehicles are those powered by both gasoline and electricity. Since these vehicles are not entirely gasoline powered, gas mileage and emissions are reduced. While these vehicles are causing the same amount of damage to the roadways as their less fuel-efficient counterparts, they are contributing less to the highway fund.

1.2.1 Growth of hybrid vehicle market

The sale of hybrid vehicles is on the rise, and therefore, must be considered when seeking an approach for alternative highway funding. According to J.D. Power-LMC Automotive Forecasting Services, hybrid vehicles accounted for 0.5 percent of the United States (U.S.) market in 2004. This number is projected to rise to 3.5 percent by 2012. Also, the number of hybrid models on the market is expected to increase from 10 in 2005 to 44 by 2012 ("J.D. Power Forecasts Hybrids and Diesels to be 11 percent of Ales in 2012" 2005). According to hybridcars.com, U.S. hybrid sales have nearly doubled each year since 2000 as seen in Table 1-2, and it predicts that by the year 2010, five to six percent of all cars sold in the U.S. will be hybrid vehicles ("Sales Numbers" 2005). The American Association of State Highway and Transportation Officials estimates that by the year 2020, hybrids will account for fifteen percent of the U.S. vehicle market (Epstein 2005). With such a substantial portion of vehicles requiring much less gasoline than ordinary vehicles, a decline of the fuel tax revenue is inevitable. Even though hybrids may not seem to be an immediate threat to funding, they could contribute to noticeable decreases in funding in 10 to 15 years in the future.

1.2.2 Hybrid vehicle purchases as related to fuel prices

Hybrid vehicle sales tend to fluctuate somewhat as gas prices change. For example, in May 2005, hybrid sales declined as the gas prices dipped. Alternatively, as gas prices reached new highs in August 2005, hybrid sales climbed to a record high of 23,307 sales in one month ("Sales Numbers" 2005). Some experts predict that sometime between 2010 and 2030 the world production of oil will peak and enter a permanent decline. After this peak, gasoline prices will greatly increase; resulting in a greater rate of alternatively powered vehicle use (Oregon Department of Transportation 2005). The U.S. is also reliant on obtaining oil from countries with volatile political climates. Disruptions in oil production resulting from political disturbances cause fuel price increases that may increase the demand of more fuel-efficient vehicles. Current political climates as well as damage from recent hurricanes allow no reprieve for the climbing fuel prices. Therefore, it is prudent to investigate methods to replace the revenue that is expected to be lost to increased use of hybrid vehicles.

Table 1-2. U.S. hybrid vehicle sales by year (2000 – 2005)

Year	Vehicles Sold
2000	9,350
2001	20,287
2002	35,000
2003	47,525
2004	88,000
2005	154,563 (through September 2005)
2005	206,084 (projected through December 2005)

1.2.3 Other fuel efficient vehicles

Hybrid vehicles are becoming more popular, and the sales of other fuel efficient vehicles are gaining momentum as well. Honda, as well as other American automakers, is exploring more efficient gas engines, diesel engines, and natural-gas vehicles. The technology, hardware, and software used in electric motors can also transfer to hydrogen fuel-cell vehicles, which may be widely available in the future (Popely 2005). As technology advances, the consumers' interest in alternative fuel vehicles will increase. Innovations in technology are also improving the performance of regular fuel-powered vehicles. While innovations in technology are desirable from the environmental point of view, they are expected to contribute to further decline of fuel tax revenues.

Federal programs and regulations support the use of alternative-fuel vehicles. The Federal Energy Policy Act of 1992 requires that a percentage of government purchased vehicles must be

powered by alternative fuel. As of the year 2000, 80 percent of all government vehicle purchases were required to run on alternative fuels (Alabama Department of Transportation 2004). Not only does the introduction of these vehicles into the transportation system decrease fuel tax revenue, but the endorsement of the federal government to purchase alternative fuel vehicles will influence the public to do so as well. The federal government is also increasing the incentive for use of fuel efficient vehicles by offering a federal income tax reduction on the purchase of those types of vehicles. According to the Energy Information Administration the use of alternative-fueled vehicles, excluding hybrids, is growing at a rate of 9.3 percent annually (United States Energy Information Administration 2004).

Increased environmental awareness and increasingly strict federal regulations on air quality promote the development and adoption of alternative fuel vehicles, which are more environmentally friendly. This is a trend that is expected to continue in the future.

1.3 Study Objective

The potential for decreased revenue for Alabama's highways comes at a time when the current revenue sources are already strained to sustain the highway system. A recent report by the Government Performance Project cited estimates from ALDOT that Alabama currently has a $12 billion backlog of highway and bridge maintenance projects, with a $50 million increase in the total each year (Reed 2005). In the past ten years, vehicle registrations in the state have increased 37 percent, licensed drivers have increased over 26 percent, but the number of lane-miles in the state has only increased by 6 percent. Since the system is failing to keep pace with demand, it is evident that action needs to be taken to ensure the quality of Alabama's roadways.

The objective of this study was to research and evaluate alternative financing solutions for the construction, maintenance, and improvements of Alabama's roadways. The investigation of existing transportation funding options was undertaken first, followed by a detailed review of alternate financing solutions. Evaluation of alternative options was used to identify solutions with the best potential for implementation. Overall, the study assessed the strengths and weaknesses of Alabama's current highway finance system, and offered recommendations for addressing the financial shortfall for Alabama's highway funding in the near- and long terms.

2.0 Methodology

One of the main tasks of this project was to complete a thorough review of available literature. Moreover, existing data from U.S. states was compiled and reviewed. Much of this information was gathered from resources available from various states' Departments of Transportation (DOTs) and Department of Revenue or Finance (DOR) websites. A listing of these sites can be found in Appendices A and B, respectively. A lot of information was compiled from reports from 1995 to 2004 from the FHWA Highway Statistics. Innovative and alternative funding sources were reviewed for U.S. states as well as international sources. After considering the available data, several alternative solutions for Alabama highway funding were proposed and forecasts of future revenue were predicted for the selected alternatives. Some projections, such as population estimates, were done using trendline analysis in Microsoft Excel. Currency conversion was performed using CNNMoney.com (2006).

3.0 Background

3.1 Alabama Transportation Funding

The Federal Aid Highway Act of 1916 required that each state have a highway agency to receive federal road funds. This act "essentially created modern road building" (American Society of Civil Engineers 2006). Since then, continuous improvements have been made to Alabama's roadway system resulting in a high level of service and mobility for Alabama drivers. Continuous improvements are vital for the state to prosper economically and to provide quality of life for its citizens. This will require sustainable funding sources.

Currently, Alabama's primary influx into the highway fund comes from federal funding and is supplemented by state contributions. The state's most valuable in-house source of income for funding highways comes from gasoline and motor fuels taxes. Auto license fees and petroleum inspection fees are also components of revenue. Over $1.5 billion is budgeted to be collected in Alabama in the fiscal year of 2004 – 2005 (Alabama Office of the Governor 2005).

3.1.1 Alabama transportation system

Alabama's transportation system consists of five major interstate highways (I-10, I-20, I-59, I-65, and I-85), five perimeter highways (I-165, I-359, I-459, I-565, and I-759), as well as numerous other arterial, collector and local roads.[6] The total number of lane-miles of Alabama roadway in 2004 totaled 197,892 miles (United States Federal Highway Administration 1995 – 2004). Alabama's roadway surfaces have a useful life of twenty years or less, therefore ongoing resurfacing is necessary to maintain adequate quality of roadway pavements.

Alabama has over 15,000 bridges. By the year 2025, 75 percent of these bridges will be at least 50 years old and in need of major work (Alabama Department of Transportation 2000). In the year 2000, the backlog of state-owned non-interstate bridges requiring replacement or rehabilitation was already 1,334. By the year 2025, the number of bridges on backlog is estimated to increase to 2,060. Assuming a 3 percent annual inflation rate, the total additional funding needed by the year 2025 to pay for this backlog will reach $7 billion (Alabama Department of Transportation 2000). Considering this amount of additional funds would only cover the bridge rehabilitation portion of the budget, it is apparent that additional funding is needed for the system.

There is an abundance of road work to be completed each year, before even considering new construction and widening of roadways and bridges to increase traffic capacity. Transportation experts and local government officials agree that Alabama's roadways are a complex and

interconnected system that requires more maintenance and construction than the current revenue budgets allow.

3.1.2 Alabama revenue sources

The percentage of revenue coming from different sources provides great insight into the benefits and vulnerabilities of Alabama's current system. Figure 3-1 shows a complete breakdown of ALDOT's revenue for highway funding for the 2004 – 2005 fiscal year. The figure shows that federal aid totals over $1 billion (Alabama Office of the Governor 2005) and accounts for over 67 percent of all budgeted funding. As a result, Alabama is highly dependent on federal legislation, such as the Transportation Equity Act for the 21st Century (TEA-21), over which it has no control. Additionally, Figure 3-2 illustrates the breakdown of revenue generated by the state, not including federal funding. Of the $473,568,645 budgeted, over $214 million is generated from gasoline taxes, and over $118 million is from motor fuels taxes (Alabama Office of the Governor 2005). Together these fuel taxes make up approximately 70% of Alabama's total in-state revenue. Therefore, it is apparent that Alabama's system is currently dependent on the collection of gasoline and fuel taxes to fund highway transportation. As a result, any disruption to these proceeds, such as lower fuel consumption, will be a huge detriment to ALDOT's revenue for highway improvements.

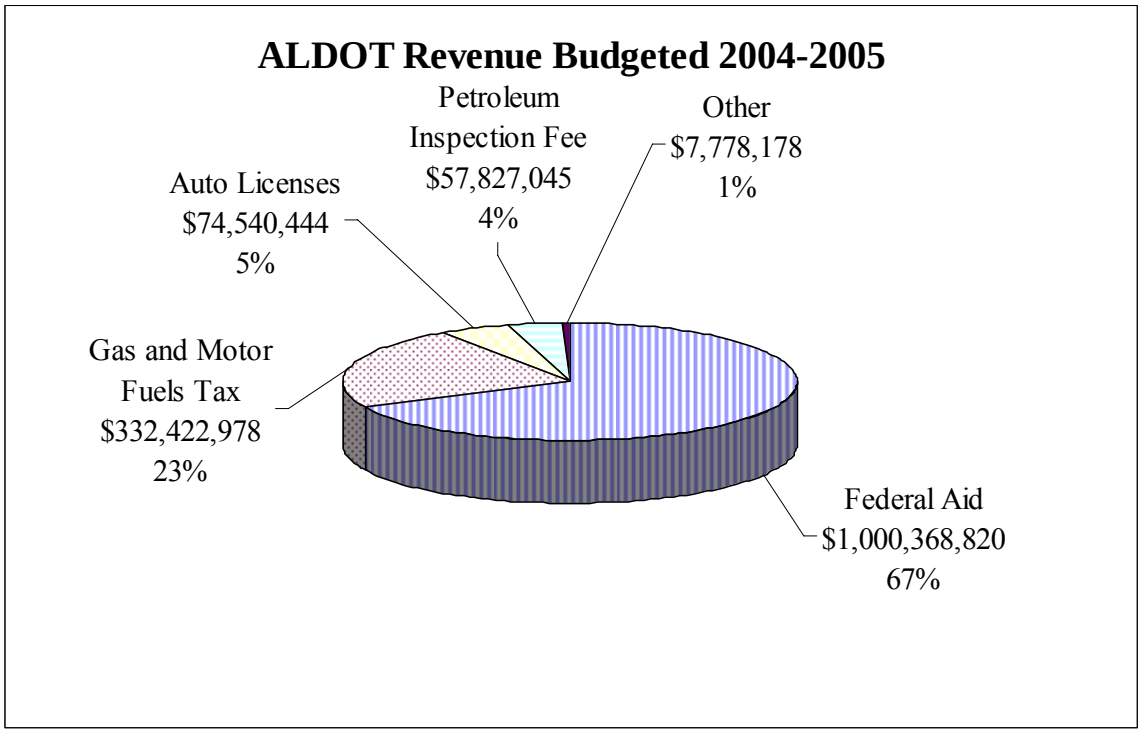

Figure 3-1. Breakdown of ALDOT revenue sources from state and federal funds budgeted in 2004-2005

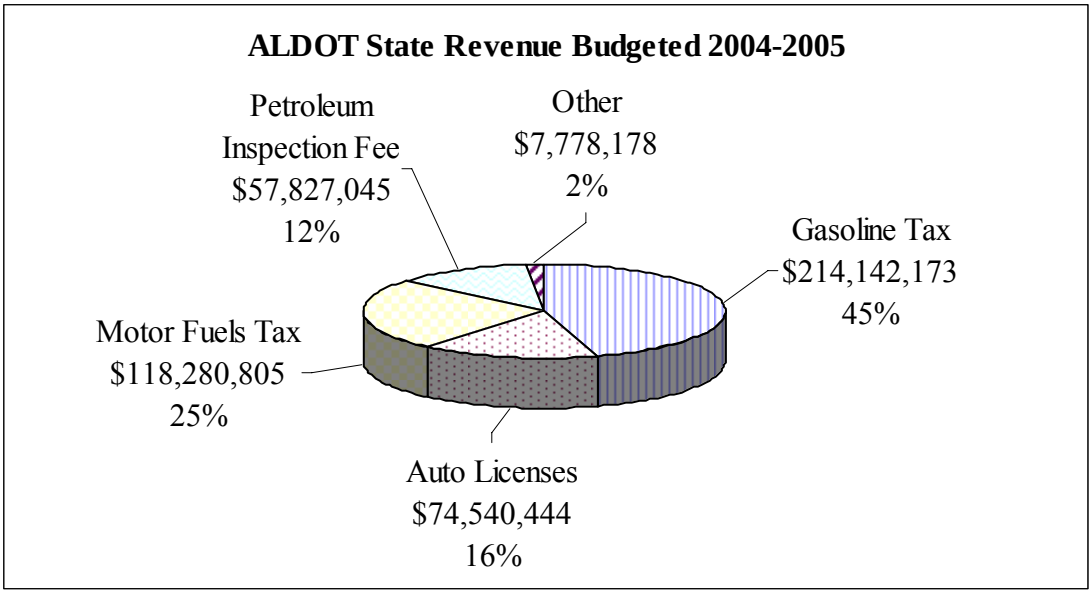

Figure 3-2. Breakdown of ALDOT revenue sources from state funds budgeted in 2004-2005

3.1.3 Fuel taxes as a revenue source

A focus on fuel and gasoline taxes is justified, because of the high percentage of revenue these funds encompass. Figure 3-3 illustrates Alabama's current fuel tax rate as compared to other states in the Southeast, as well as the national average. Currently, Alabama's state gasoline tax is 18 cents per gallon, one of the lowest rates reported, and well below the national average of 21.53 cents. In fact, as illustrated in Figure 3-4, since the year 1988 Alabama's gasoline tax rate has fallen short of the national average. It is also worth noting that the state's fuel tax rate has not increased since 1992. If this tax had been indexed for inflation, the rate would be 27 cents per gallon today. Figure 3-5 illustrates the difference between the Alabama's actual gasoline tax rate versus the rate adjusted for three percent inflation per year. This alarming stand-still in the gasoline tax is an indication that although road users desire improved roadways, there is an unwillingness to commit to increased taxes to fund these improvements. Additionally, a large amount of gasoline tax revenues must be used to match federal dollars. Usually, these federal dollars are earmarked for specific uses. Therefore, as the federal level of funding increases, the amount of maintenance dollars from the gasoline tax that can be used to maintain Alabama's highways is further reduced (Reed 2005). At the same time that revenue generated from gasoline tax is decreasing due to use of hybrid and fuel efficient vehicles, voters are refusing to increase taxes, and more funds are being used to match federal funds. These all point toward gasoline tax being an unsustainable future revenue source for Alabama highways.

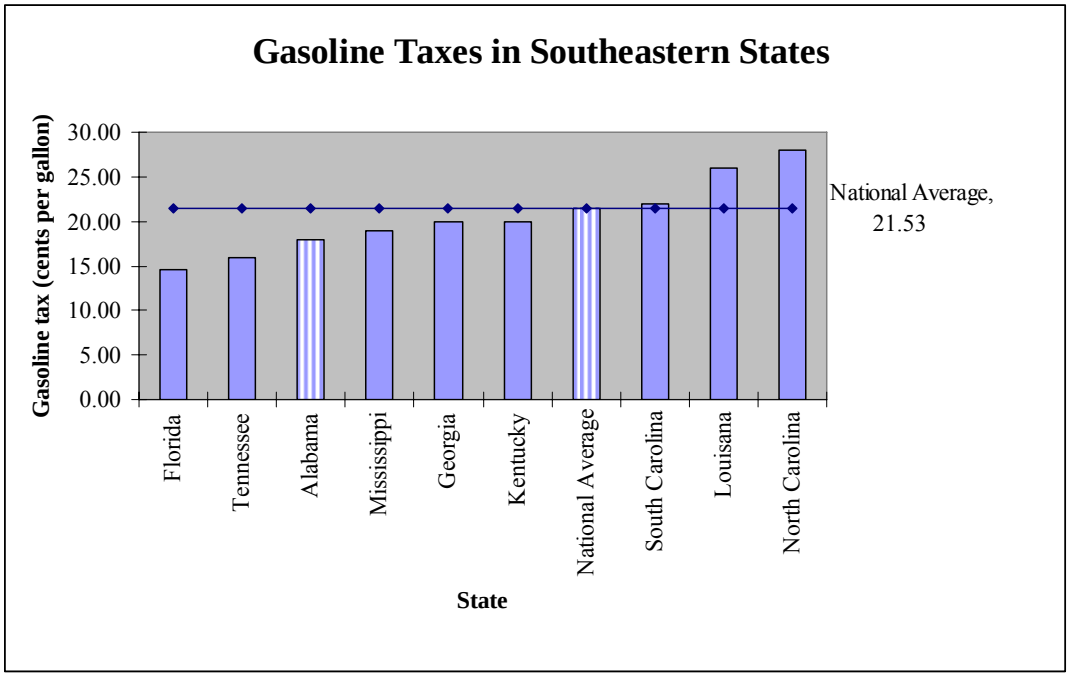

Figure 3-3. Comparison of gasoline taxes in southeastern states

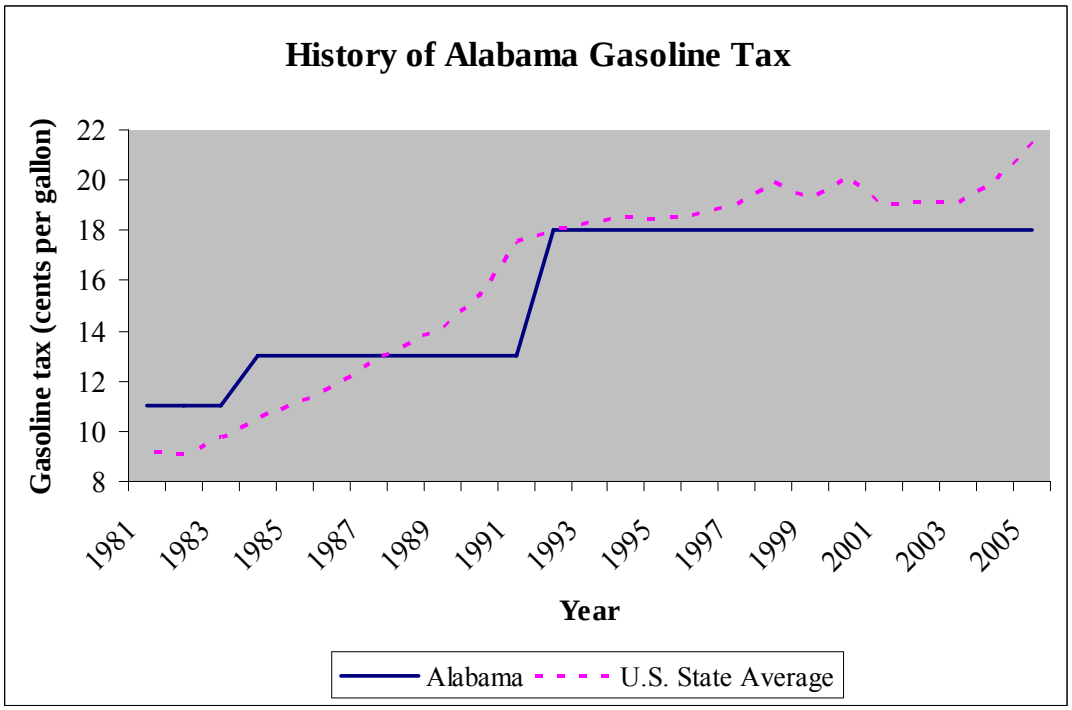

Figure 3-4. History of Alabama's gasoline tax compared to the national state average

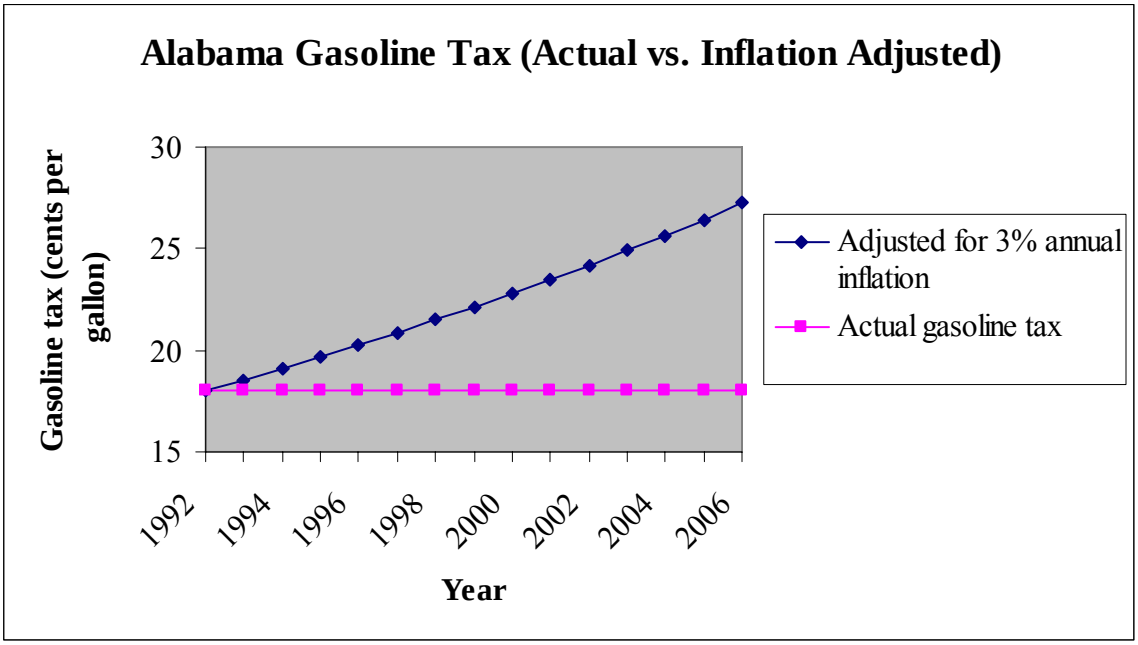

Figure 3-5. Alabama gasoline tax (actual versus inflation adjusted)

3.1.4 Registration fees as a revenue source

Registration fees, or automobile licenses, are also an important source for highway revenue in Alabama. These funds amount to five percent of the total ALDOT funding, including federal funds and 16 percent of the funding generated by the state. However, more money could be diverted from this source to the highway fund as only a portion of the money generated from registration fees currently goes to the DOT. The annual registration/license fee for automobiles is $13 plus an additional fee of $10 ($7 plus an additional fee of $8 for motorcycles). Motor homes and trucks are charged a base amount, an additional fee of $10, plus an additional amount as determined by the weight of the vehicle (Ross 2005).

A breakdown of the allocation of registration fees can be seen in Table 3-1. From its share, ALDOT must also pay the DOR for the expenses incurred to collect the fees, including cost of tags and salaries, an amount that cannot exceed more than 5 percent of the proceeds. These fees have not been adjusted in over 20 years (Ross 2005). As with the gasoline tax, registration fees could benefit from an increase at least to keep up with inflation.

To further investigate the potential that registration fees could be diverted for highway funding, it is beneficial to compare Alabama's revenue to that of another state. For example, when comparing Alabama's and Florida's vehicle registration fee revenues that are contributed to the state DOT, a large discrepancy is found. In 2003, Florida registered approximately 14.6 million vehicles, including automobiles, motorcycles, trucks, and buses, and Alabama close to 4.4 million vehicles (United States Department of Transportation 2004). However, it is interesting to

note that the amount of money distributed to the DOT for vehicle registration fees is much different. More specifically, ALDOT received $65.8 million from registration fees in FY 2003-2004 (Alabama Office of the Governor 2005), while the state of Florida's DOT received nearly $500 million from such fees. This indicates that Florida's DOT income from registration fees was over 7.5 times that of Alabama's, while its vehicle registrations were just 3.4 times larger. An adjustment in the way Alabama distributes the revenue from these vehicle registration fees could significantly increase the money available to ALDOT for funding transportation-related projects (Ross 2005).

Table 3-1. Breakdown of distribution of vehicle registration fees

Base Amount Distribution	
2.50%	Probate Judge of County where vehicle is registered
5.00%	AL Department of Transportation
66.60%	ALDOT (72% of remaining amount of 92.5%)
25.90%	Municipalities & Counties (28% of remaining amount of 92.5%)
100.00%	Total
Additional Amounts Distribution	
65%	ALDOT
35%	Counties
Additional Fees	
100%	General Fund for the Department of Public Safety

Note: ALDOT (Alabama Department of Transportation)

3.1.5 Vehicle title fees

Another revenue source not currently tapped for the ALDOT is the collection of vehicle title fees. Currently, none of these fees are used to fund the DOT (Ross 2005). In fiscal year 2003 – 2004 auto title tax brought in over $21.5 million for the state's general fund (Alabama Office of the Governor 2005). Some people contend that title fees are an excise tax and, according to the Constitution, should be given directly to the DOT. However, this argument has not prevailed as of yet (Ross 2005).

3.2 Highway Funding of Other States

3.2.1 Overview of funding by states

All states in the U.S. depend on multiple revenue sources for highway funding. Two funding sources that all of the states have in common are fuel taxes and federal funding. An overview of the main sources of highway funding for each state is seen in Table 3-2. The motor vehicle fees referenced in this table refer to license fees, vehicle registration fees, and vehicle weight taxes,

permits, and fees. It can be seen that the main source of revenue for all states, besides federal funding, is fuel tax revenue.

Table 3-3 shows a ranking of states by their fuel tax rate. Gasoline fuels range from 42.60 to 7.50 cents per gallon. Alabama is ranked 36th among the 50 states and District of Columbia, with an 18 cents per gallon gasoline tax.

Table 3-2. Primary revenue sources dedicated to highway funding by state

State	Fuel Tax	Motor Vehicle Fees[a]	Title Fees	Inspec-tion Fees	Federal Funding	Bonds	Tolls[b]	Investments and Interest Income	Various Sales Tax	Other
Alabama	✓	✓			✓					i
Alaska	✓				✓	✓	✓			c
Arizona	✓	✓			✓	✓				d
Arkansas	✓	✓			✓	✓				
California	✓	✓			✓		✓			
Colorado	✓	✓			✓	✓	✓		✓	
Connecticut	✓	✓	✓	✓	✓					
Delaware	✓	✓			✓	✓	✓	✓		
District of Columbia	✓	✓	✓	✓	✓				✓	
Florida	✓	✓	✓	✓	✓		✓		✓	
Georgia	✓		✓	✓	✓		✓			
Hawaii	✓	✓			✓			✓		
Idaho	✓	✓	✓		✓					
Illinois	✓	✓			✓	✓	✓			
Indiana	✓	✓	✓		✓		✓		✓	
Iowa	✓	✓			✓		✓		✓	
Kansas	✓	✓	✓		✓	✓		✓	✓	
Kentucky	✓	✓	✓	✓	✓		✓		✓	
Louisiana	✓	✓	✓	✓	✓		✓		✓	
Maine	✓	✓		✓	✓	✓				
Maryland	✓	✓	✓		✓	✓	✓			e
Massachu-setts	✓	✓	✓	✓	✓	✓	✓			f
Michigan	✓				✓		✓		✓	
Minnesota	✓	✓			✓	✓	✓	✓	✓	
Mississippi	✓	✓		✓	✓	✓		✓		g
Missouri	✓		✓	✓	✓		✓		✓	

[a] – Motor vehicle fees include license fees, motor vehicle registration fees, and vehicle weight taxes and permit fees
[b] – Tolls includes highways, bridges, and tunnels
c – Local taxes (Except for federal matching dollars, all revenues are distributed through the general fund)
d – Highway expansion and loan program, grant anticipation loans, lottery proceeds
e - Corporate income taxes
f – District Improvement Financing Program (DIF)
g - Gaming tax, Lubricating oil tax
h - Property Taxes
i – ALDOT does not use tolls, but private entities have used them to fund some bridges.

***Table 3-2*. Primary revenue sources dedicated to highway funding by state (continued)**

State	Fuel Tax	Motor Vehicle Fees[a]	Title Fees	Inspection Fees	Federal Funding	Bonds	Tolls[b]	Investments and Interest Income	Various Sales Tax	Other
Montana	✓	✓	✓		✓					
Nebraska	✓	✓			✓		✓	✓	✓	
Nevada	✓	✓			✓	✓				
New Hampshire	✓			✓	✓		✓			
New Jersey	✓	✓	✓		✓		✓		✓	
New Mexico	✓				✓	✓			✓	
New York	✓	✓		✓	✓		✓		✓	h
North Carolina	✓		✓	✓	✓				✓	
North Dakota	✓	✓			✓		✓			
Ohio	✓	✓	✓	✓	✓	✓	✓		✓	
Oklahoma	✓		✓		✓	✓			✓	
Oregon	✓	✓	✓	✓	✓		✓			
Pennsylvania	✓	✓	✓		✓		✓			
Rhode Island	✓		✓	✓	✓		✓		✓	
South Carolina	✓	✓	✓		✓				✓	
South Dakota	✓	✓	✓	✓	✓					
Tennessee	✓				✓	✓				
Texas	✓	✓	✓	✓	✓	✓	✓		✓	
Utah	✓	✓	✓	✓	✓					
Vermont	✓	✓	✓		✓		✓		✓	
Virginia	✓	✓		✓	✓		✓	✓	✓	
Washington	✓	✓			✓	✓	✓			
West Virginia	✓	✓	✓		✓		✓	✓		
Wisconsin	✓	✓			✓					
Wyoming	✓	✓	✓	✓	✓				✓	

[a] – Motor vehicle fees include license fees, motor vehicle registration fees, and vehicle weight taxes and permit fees
[b] – Tolls includes highways, bridges, and tunnels
c – Local taxes (Except for federal matching dollars, all revenues are distributed through the general fund)
d – Highway expansion and loan program, grant anticipation loans, lottery proceeds
e - Corporate income taxes
f – District Improvement Financing Program (DIF)
g - Gaming tax, Lubricating oil tax
h - Property Taxes
i – ALDOT does not use tolls, but private entities have used them to fund some bridges.

Table 3-3. State fuel tax rankings (high to low based on gasoline tax)

Ranking	State	Gasoline (cents/gallon)	Diesel (cents/gallon)
1	New York	42.60	19.00
2	Wisconsin	32.90	8.00
3	Pennsylvania	31.10	26.00
4	Washington	31.00	22.70
5	Rhode Island	30.00	18.00
6	Ohio	28.00	20.50
7	Montana	27.75	26.00
8	North Carolina	27.10	22.00
9	West Virginia	26.50	20.00
10	Maine	25.90	27.30
11	Nebraska	25.30	7.50
12	Connecticut	25.00	16.00
13	Idaho	25.00	25.00
14	Utah	24.50	21.50
15	Kansas	24.00	16.00
16	Oregon	24.00	22.50
17	Maryland	23.50	26.00
18	Massachusetts	23.50	13.10
19	Delaware	23.00	20.00
20	Nevada	23.00	27.00
21	North Dakota	23.00	24.25
22	Colorado	22.00	23.50
23	South Dakota	22.00	15.00
24	Arkansas	21.70	20.00
25	Tennessee	21.00	18.40
26	Iowa	20.70	17.00
27	District of Columbia	20.00	28.50
28	Louisiana	20.00	25.30
29	Minnesota	20.00	27.00
30	Texas	20.00	18.00
31	Vermont	20.00	17.50
32	Illinois	19.00	18.00
33	Michigan	19.00	42.50
34	Kentucky	18.50	27.10
35	Mississippi	18.40	23.00
36	**Alabama**	**18.00**	**19.00**
37	Arizona	18.00	14.00
38	California	18.00	24.00
39	Indiana	18.00	35.10
40	New Hampshire	18.00	30.00
41	Virginia	17.50	16.00
42	Missouri	17.00	22.00
43	New Mexico	17.00	18.40
44	Oklahoma	17.00	20.00
45	Hawaii	16.00	24.50

Table 3-3. State fuel tax rankings (high to low based on gasoline tax) (continued)

Ranking	State	Gasoline (cents/gallon)	Diesel (cents/gallon)
43	New Mexico	17.00	18.40
44	Oklahoma	17.00	20.00
45	Hawaii	16.00	24.50
46	South Carolina	16.00	26.00
47	Florida	14.50	16.00
48	New Jersey	14.50	31.00
49	Wyoming	14.00	26.50
50	Alaska	8.00	32.90
51	Georgia	7.50	14.00

3.2.2 State highway funding and declining revenue

Many other states, besides Alabama, are concerned about maintaining revenue sources adequate to meet the demand for highway projects. For example, in 2002 the Governor of Colorado initiated a transportation plan in response to a $15 billion shortfall in transportation needs for the state. The Task Force on Transportation Finance in the state of Colorado also determined that the VMT is growing at double the rate of population growth (Colorado Transportation Finance Task Force 2004). This led to an increased deterioration of the highway system. Additionally, Kentucky has seen a larger increase in highway construction costs than in revenues (Kentucky Transportation Cabinet 1999). Another state that recognizes the impact of declining revenue sources is New Jersey. In a 2003 report, a commission in New Jersey determined that without a significant influx of new revenue sources, the state's transportation fund would not be able to fund any new projects by the beginning of fiscal year 2006. The New Jersey commission recognized the importance of "swift and forthright action" to find alternative funding for the highway fund (New Jersey Department of Transportation 2003). In the 1990s the Texas DOT noticed that traditional funding could no longer match the growing demand of highway use (Texas Department of Transportation 2005). To address this reality, many states have begun to examine the importance of protecting the dwindling highway fund revenue sources.

The declining nature of motor fuels tax revenues is the most urgent matter to cause concern for future revenue for highways. The Colorado task force addressed the concern of increased use of alternative fuels and fuel-efficient vehicles and the consequent reduction of fuel tax revenues (Colorado Transportation Finance Task Force 2004). In the state of Iowa, more than 88 percent of the revenue for the Highway Trust Fund comes from fuel taxes (Iowa Department of Transportation 2002). Additionally, almost eighty percent of money spent on North Carolina transportation comes from gasoline taxes and motor vehicle fees (NCDOT Public Transportation Division 2005), and in South Carolina, only 11 percent of the DOT funding comes form sources other than motor fuels taxes (South Carolina Department of Transportation 2005). The Texas DOT's 2005 – 2009 Strategic Plan, notes that the declining revenue situation will get worse as the use of more fuel-efficient vehicles increases. The gas tax can no longer support the system, and other methods need to be reviewed (Texas Department of Transportation 2005). It is apparent that such high dependence on fuel taxes will result in declining revenues in the future.

3.2.3 Innovative solutions by U.S. states

In August of 2003, Massachusetts signed into law an innovative financing solution known as District Improvement Financing Program (DIF). DIF is a public financing solution available to all cities and towns in the state under which public improvements are financed using the projected increase in property tax revenues that are expected to result from the improvements. These projected increases can then be used to back the issuance of bonds. DIF is appropriate to use in site-specific projects, such as roadway improvements. One of the advantages to DIF is that no new taxes are levied or redirected (Massachusetts Executive Office of Transportation 2005).

Several states utilize electronic tolling methods to finance highways. The most common of these is the E-ZPass system used on many toll roads and bridges throughout the northeastern U.S. The states share the same technology, but each has its own billing and customer service. The shared technology makes the system more user-friendly in that the same E-ZPass tag can be used in several different states. E-ZPass is maintained as a debit account, and tolls are deducted from prepayments made by the user. These E-ZPass tags are Radio Frequency Identification (RFID) transponders that communicate with equipment in the toll collection lanes. Usually, these tags are inserted on the inside of the vehicle's windshield ("E-ZPass" 2005).

The State of Oregon is aggressively studying a road user fee levied on users as a mileage fee instead of a fuel tax. This fee is based on the distance traveled instead of a fuel tax. The state has developed a task force to study the road user fee program. The task force intends that the fuel tax would ultimately be completely replaced by the mileage fee as the principal revenue source for Oregon roads (Oregon Department of Transportation 2005).

The state of Indiana has privatized portions of its National Highway System. A major international corporation has purchased them and will operate them as toll facilities. The state will receive a significant percent of income from the purchase.

3.3 Innovative Highway Funding in Countries Other than the U.S.

The United States is not the only nation looking to increase revenue for transportation investment in innovative ways. Literature sources indicate that decreased fuels tax revenue is also a concern of other countries around the world. Switzerland, Austria, Germany, Britain, and New Zealand have all been studying alternative revenue sources due to this declining trend ("The Road Tolls for Thee" 2004). More specifically, the United Kingdom (UK) is looking into a system that would eliminate car taxes and replace them with a pay-as-you-drive system of fees (Craig 2004). Furthermore, both Canada and Australia use innovative tolling collection techniques. More sophisticated tolling facilities have completely eliminated on-site tolling and rely entirely on transponders and license plate imagine to bill drivers (Samuel 2000).

Many countries are using the privatization of toll roads as a financing solution. In some countries private sector ownership of roads has become the conventional way to provide major new

highways. Some countries are selling their existing toll roads to private sources, including Canada, Italy, Portugal, France, Spain, and Japan (Samuel 2005). Australia continues to set the pace for investor-developed and operated projects (Reason Public Policy Institute 2004).

Several countries have begun using a truck road user fee. Switzerland and Austria began charging trucks road user fees in 2001 and 2004, respectively ("The Road Tolls for Thee" 2004). In Germany, a system has been implemented to tax heavy trucks using the Autobahn. Many of these systems utilize on-board units (OBUs) in the trucks to charge the drivers based on the number of miles driven within a country, zone, or specific highway. Details of international innovative highway funding strategies are discussed next.

3.3.1 United Kingdom tolling

An innovative method for congestion pricing has been implemented in the UK, and it has potential as a revenue generation strategy. This approach will eventually eliminate most of the fees under the current motor taxation system, including the car tax, vehicle excise tax, and the gas tax (Craig 2004). The system employs roadside cameras that record the license plate of every vehicle entering the "congestion charge" zone. Nearly 700 video cameras within the zone capture images of license plate numbers. Each camera is connected through a fiber-optic link to the data center. Drivers pay the £5 ($9) fee through various means, such as shops, the internet, or by phone. A database checks the plate numbers to determine those vehicles that have paid the fee, and those which have not paid are issued a fine in the mail ("The Road Tolls for Thee" 2004).

3.3.2 Switzerland truck user fee

The Swiss system is called the "distance based heavy vehicles fee" (LSVA). The system charges transport companies between €0.11 ($0.13) and €0.45 ($0.54) per kilometer ("The Road Tolls for Thee" 2004). These charges are approximately equivalent to a range of $0.21 and $0.86 per mile. The Swiss system does not utilize the most advanced technology available, but rather uses a basic approach. Designated Short Range Communication (DSRC) beacons located at the country's borders activate and deactivate each truck's OBU as it enters or leaves the country. These DSRC units rely on microwave or infra-red signals. The OBU consists of an odometer and a global positioning system (GPS) unit. The GPS is simply used as an auditing tool, to verify the accuracy of the data from the odometer. The readings are stored on a smart card which is either sent to the customs authorities or downloaded online. This basic approach is sufficient, because the goal is to charge for the distance driven, not for type of road or route taken. An advantage to this system is that it does not encourage truck operators to switch to an alternative route, from highway to byways. Enforcement is done using DSRC beacons on the roadsides and visually by police. Colored lights on the OBU indicate whether a truck is operating legally. This system has performed very well, and is cost effective as only six percent of the generated revenue is spent on operating costs ("The Road Tolls for Thee" 2004).

3.3.3 Germany truck user fee

The German truck user fee system is called Toll Collect. Although the German system is technologically much more complex than the Swiss system, the Germans only charge a toll on the autobahn as opposed to any miles driven in the country. Trucks weighing more than 12 metric tons, or around 26,000 pounds, are subject to the toll. In addition to collecting fees, the system can also be used in the future for services such as fleet management, traffic alerts, and navigation. The OBUs used in the Toll Collect system use GPS, an odometer, and a gyroscope. GPS technology is only accurate to within a few meters. Therefore, the odometer and gyroscope compensate for weakness of the GPS technology to provide the accurate position of the truck. In areas where other roads run close to the autobahn, readings from microwave beacons work with the components of the OBUs to determine the position of the trucks with even greater accuracy. The OBU calculates the toll and communicates the information via a mobile phone network so a bill can be issues. Toll rates range between €0.09 and €0.15 per kilometer ("The Road Tolls for Thee" 2004), or $0.18 to $0.29 per mile. Enforcement is done using cameras to determine if a truck is registered in the system. These cameras are mounted on steel structures spanned over the autobahn and locate at numerous points throughout the roadway. There are also police who perform spot checks to ensure compliance ("The Road Tolls for Thee" 2004). The German system did not go into effect until sixteen months after the scheduled date because of software and organizational problems ("Germany Takes US$1 Million in New Autobahn Tolls" 2005). During a trial held from September to November 2004, the system achieved an accuracy of 99.3% and was therefore permitted by the German government to begin operating on January 1, 2005. In spite of the long delay, the system now seems to be working successfully (United States Census Bureau 1995).

4.0 Alternative Financing Solutions

4.1 Vehicle Mileage Road User Fee

4.1.1 Overview

The Vehicle Mileage Road User Fee (VMRUF) charges the vehicle owner based on the distance traveled by a vehicle on the road system. This is an option for replacing the current dependency on fuel tax revenues for highway funding. Using a fee that is much more equitable than a fuel tax, especially in light on the projected increase in the number of alternative fueled vehicles in the future.

Much of the information learned about this type of road user fees was gained from the Oregon Department of Transportation (Oregon Department of Transportation 2005). According to the Oregon Department of Transportation, a per-mile fee could be collected both efficiently and inexpensively using modern technologies. This technology consists of an OBU in the vehicle that communicates directly with the system at the pump.

One might argue that the incentive to purchase more fuel efficient vehicles is diminished by altering the revenue source from a tax per gallon to a mileage fee. However, substantial savings will still be seen on the cost of fuel alone, ignoring the effect of the gas tax. With fuel costs approaching $3.00 per gallon, Alabama's gas tax is only a small percentage of the total cost of fuel. In the past year, gas prices in the state have fluctuated between $2 and $3 per gallon. With an assumed average of $2.50 per gallon, the $0.18 Alabama gas tax is only seven percent of the entire cost to fuel a vehicle. Therefore, the nature of the gas tax should have little effect on the decision to purchase a more fuel-efficient vehicle.

For instance, the savings on gas expense in general can be seen in a comparison of the Honda Civic to the Honda Civic Hybrid vehicles (Table 4-1). An Alabama motorist drives an average of 12,926 miles annually (United States Federal Highway Administration 1995 – 2004). Using the fuel economy estimates provided by the U.S. Department of Energy (2005), the annual savings of an Alabama driver of the Honda Civic Hybrid over the standard Honda Civic is $305.80, excluding the gas tax.

In fact, the user fee could be set-up to encourage the purchase of such vehicles to promote conservation and a cleaner environment. In such a circumstance, the per mile rate for more fuel efficient vehicles could be slightly lower than the regular. However, it is the responsibility of the legislature to make such decisions, and that is beyond the scope of this research.

Table 4-1. Comparison of fuel costs between Honda Civic and Honda Civic Hybrid

Vehicle	EPA Fuel Economy Estimate-City (MPG)[a]	EPA Fuel Economy Estimate-Hwy (MPG)	Average Fuel Economy (MPG)	Annual gas expense ($2.50/gallon) including gas tax	Annual gas tax expense ($0.18/gallon)	Annual gas expense (fuel cost only)
2005 Honda Civic	30	34	32.0	$1,009.84	$72.71	$937.14
2005 Honda Civic Hybrid	47	48	47.5	$680.32	$48.98	$631.33
Savings (including gas tax)		$329.53				
Savings (excluding gas tax)		$305.80				

a – MPG (miles per gallon)

4.1.2 Implementation of vehicle mileage road user fee program in Alabama

Under this program, instead of the current gasoline tax, all VMT would be charged a per-mile fee. Using developed technology, Alabama drivers would be charged at the pump a road user fee based on the number of miles driven within the state. This technology consists of an odometer and GPS in a vehicle OBU, as well as computer and program technology. As part of the OBU, the odometer would count the miles driven by the vehicle, while the GPS would differentiate the zones in which the miles were driven (Oregon Department of Transportation 2005). For purposes of the mileage fee, the zone would be the state of Alabama. Additional zones could be added with different rates to implement area or congestion charges.

The system would be phased in with new vehicles. Older vehicles, as well as out of state vehicles, would continue to pay the fuels tax at the pump. The new vehicles containing the OBUs would pay the per-mile fee and receive a refund of the fuels tax. These transactions would happen at the pump, with no behavior change required by the driver from the current system. The gas stations would pay the mileage fees to ALDOT monthly, based on the fees collected.

4.1.3 Path of revenue flow

To determine the best solution to stream revenue through the new system, an understanding of the current system is required. Motor fuels taxes are paid to the Alabama DOR monthly by the distributor. In Section 40-17-1 of the Code of Alabama 1975, a distributor is defined as, "any person who acquires ownership of motor fuels directly from a supplier at or from a barge, barge line, pipeline terminal, terminal, refinery, or imports motor fuel into the state" (2006). The distributor then passes these costs along to the retail dealer. The retail dealer is defined as "any person operating a service station or other retail outlet, and engaged in the selling of motor fuel to the ultimate consumer" (State of Alabama 2006). Finally, the retail dealer is reimbursed by Alabama motorists who are the end users. Once a month, all distributors and retail dealers are required to submit a statement of sales and withdrawals of gasoline to the Alabama DOR (State of Alabama 2006). Figure 4-1 illustrates the flow of revenue at the distributor level. This relationship will remain unchanged in the new system.

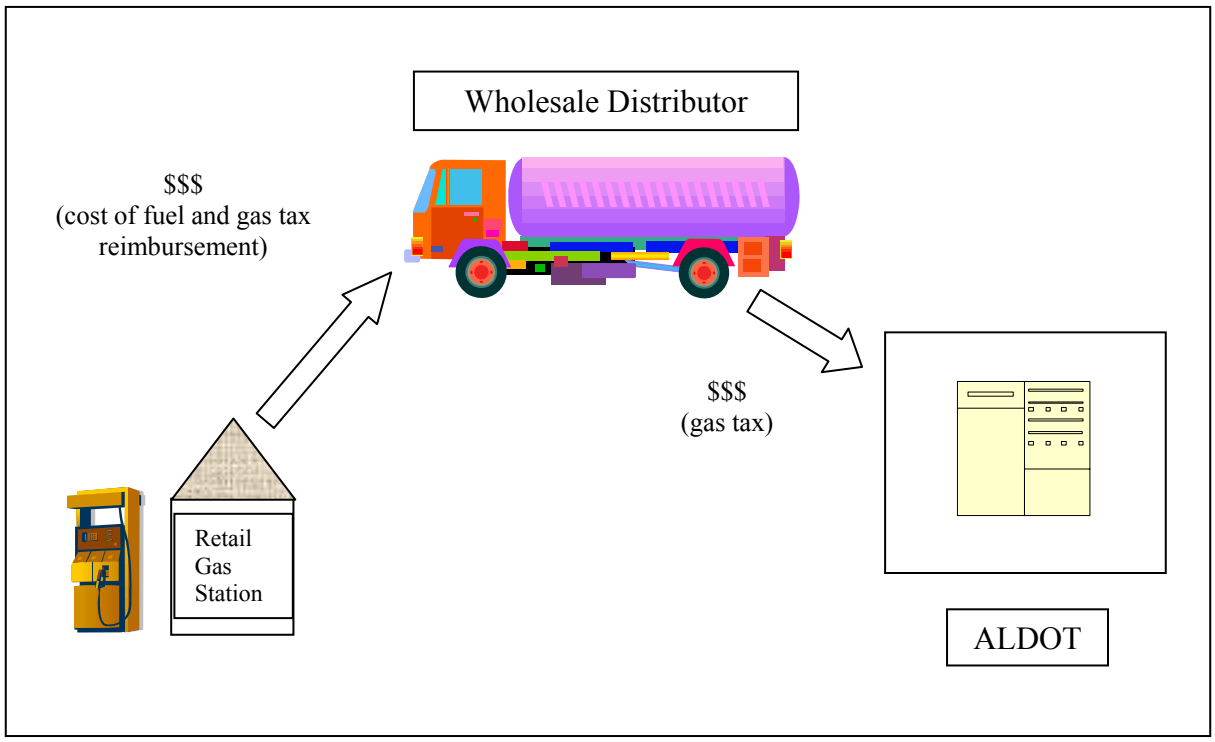

Figure 4-1. Gas tax revenue flow at distributor level

There will definitely be a discrepancy between the actual tax paid by the distributor to the DOR and the amount collected by the retailer. This discrepancy exists, because the actual taxes collected at the retail level include both gasoline taxes and mileage fees, while the costs paid by the wholesaler to the DOR are simply the fuels taxes. The monthly statements required and submitted by the distributors and retailers can be used to create an accurate and fair cash flow for the tax and user fee revenues. According to the Oregon DOT, this accounting procedure is known as "truing up" (Oregon Department of Transportation 2005). Based on these reports, ALDOT will determine whether the station has collected more or less than it paid the distributor in taxes. ALDOT will either send the station a bill or refund the amount due monthly, based on these reports. An illustration of the proposed revenue flow on the retail level can be seen in Figure 4-2.

4.1.4 Technology

The technology should be custom developed for this system of fee collection, by integrating technologies in use today and tailoring them to the specific needs of this system. The required technology should not only meet the needs of ALDOT but should also protect the privacy of Alabama citizens. The developed technology should meet the following criteria:

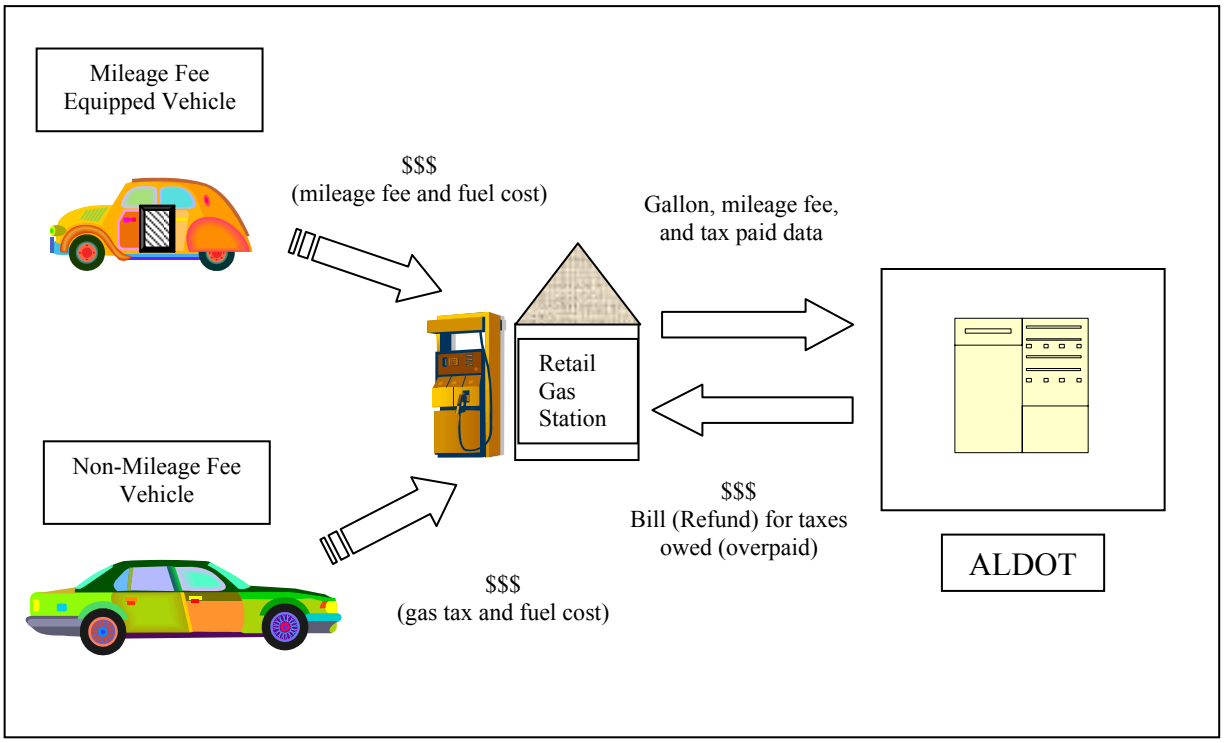

Figure 4-2. Vehicle mileage road user fee and gas tax revenue flow from end user to ALDOT

1. The system will reliably implement a system of electronic mileage-based (VMT-based) revenue collections.
2. The system will not require any additional actions by the motorist relative to the present taxation system.
3. The system must not track drivers' movements or locations of their vehicles.
4. An accurate VMT amount must be collected within the "zone" of Alabama, or any other pre-defined zones.
5. The OBU can be placed in a location on the vehicle that leaves it unseen.
6. The OBUs must be easily accessible for repair or replacement.
7. The overall system should be tamper-proof and protected to defend tax evasion.
8. The system will indicate to the user the amount of money being paid for the mileage fee.
9. The system must be able to be phased in over time.
10. The system must be able to accommodate both vehicles containing OBUs and vehicles that do not, including older vehicles and out-of-state drivers.
11. The system must reliably store taxes and fees collected and communicate with ALDOT from the retail level.

Some of the preceding requirements were taken from the Oregon DOT's assessment of a mileage-based system (Oregon Department of Transportation 2005).

The vehicle technology required for this system requires each vehicle to have an OBU made up of an odometer and a GPS receiver. The odometer/GPS hybrid technology will record the number of miles driven within the state of Alabama, or any other predetermined zone. The stored VMT data will be transmitted during refueling to a receiver in the gasoline pump by a short-

range radio frequency. This frequency is used to prevent tracking a vehicle's movements and to protect the users' privacy. The data will be sent from the pump to a host computer in the service station, which will then send a request to the central ALDOT computer for the vehicle's previous "paid for" mileage. The central computer will send this information back to the service station host computer, which will send the proper fee to the pump to be charged to the motorist in the place of the gas tax. The host computer will notify the central ALDOT computer that the transaction has been completed to update the users "paid-for" mileage amount (Oregon Department of Transportation 2005). Figure 4-3 illustrates the data flow for the vehicle mileage fee.

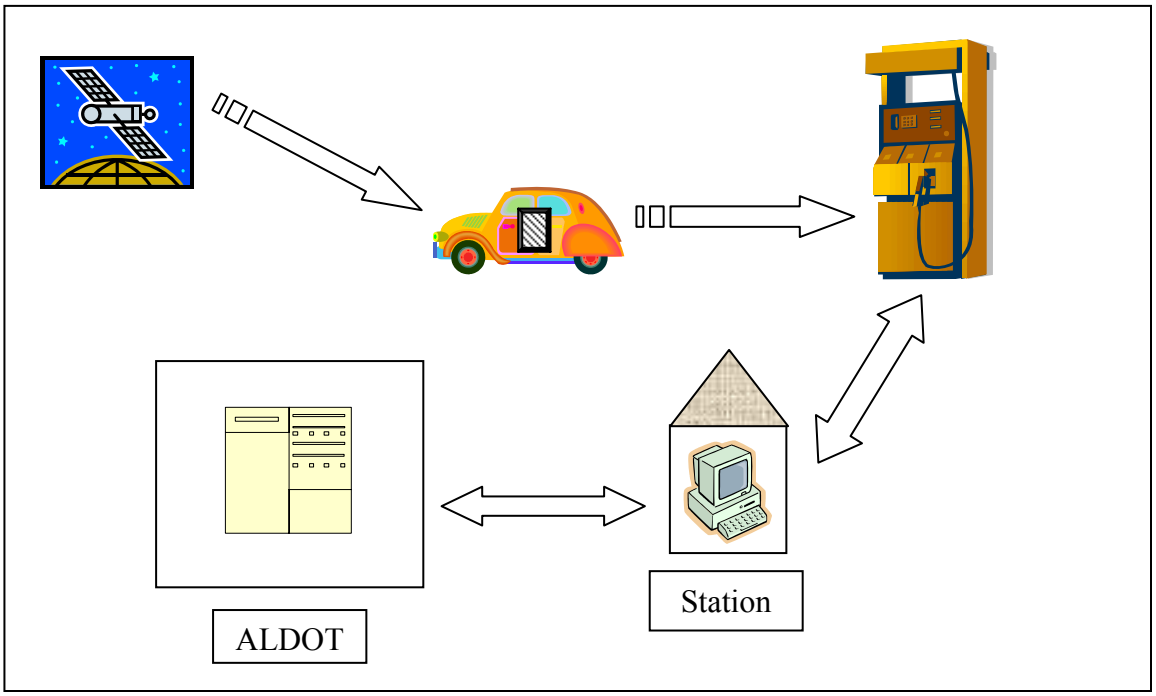

Figure 4-3. Data flow for vehicle mileage road user fee

To ensure compliance in collection of mileage fees, the electronic data transmission from the vehicle to the pump, and ultimately to ALDOT, should include (a) the VMT by zone, (b) the amount of fuel purchased in this transaction (in gallons), and (c) the vehicle identification. Additionally, the station must record with each fueling transaction the station identification and date and time of the transaction (Oregon Department of Transportation 2005). Recording this data will help to ensure that the system is working as planned. This information will also allow examination of data to look for evidence of tampering or tax evasion.

Development of software is an integral part of the system. One of the main objectives of the software is to address the needs of communications between the vehicle and the pump, and ultimately ALDOT. Additionally, the software must allow communication between the retail station and ALDOT to determine the "truing up" refund or charges, as described in Section 4.2.3.

These transactions could be done electronically and can be incorporated in the developed software. By electronically submitting required reports, ALDOT can compare the station's gallons sold, gas tax collected, and mileage fees collected to the amount the station reimbursed the distributor in gas taxes, based on the gallons purchased. This would eliminate any additional work on the part of the retail operators, and also ensure more accurate records. The retail station could even choose to have the amount owed to ALDOT or overpaid to the distributor to be debited or directly deposited into an account, further reducing paperwork and streamlining the process.

The technology designed for this system should have standards in place so that the OBUs can be used in states other than Alabama. Should neighboring states choose to follow Alabama's lead and implement a similar system of collecting highway revenue, the OBU should be able to support the collection of fees in those states.

4.1.5 Capital costs

The capital costs for the VMT road user fee consists of (a) the cost of the OBU technology, (b) the cost of the retail station technology, and (c) the cost of the central computer system at ALDOT.

The OBUs are expected to be installed only on new vehicles, therefore reducing the cost of implementation of this system. It is not economically feasible to retrofit all existing cars for this system. The cost of these units cannot be accurately determined without further research and development. However, the Oregon DOT has developed a prototype to meet the needs of their Road User Fee Pilot Program, and the per-unit cost of the prototype is less than $250 (Oregon Department of Transportation 2005). This cost will be even less when mass produced for all new vehicles. Since the cost is minimal, the OBUs should be installed by the vehicle manufacturer and included in the price of the new vehicle. This technology is already being installed for different purposes on many vehicles and would only have to be altered to serve the purposes of the mileage user fee system. For instance, General Motors announced in February 2005 that its GPS receiver navigation system will be standard on all its 2007 model vehicles ("General Motors Makes On-Star Standard" 2005). By the year 2020, it is plausible that all vehicles will come with a built-in OBU capable of charging drivers based on where and when the car is driven ("The Road Tolls for Thee" 2004). In fact, it is expected that within the next ten years wireless data transmission capability is likely to become standard on all vehicles (Oregon Department of Transportation 2005). The State of Alabama would have to legally mandate the upgrade of the software in the units to meet the specifications of the mileage road user fee system.

Statewide capital (start-up) costs include gas station equipment and computer technology. The cost to fit each retail service station with the mileage fee collection technology will vary based on the number of pumps the stations has and the technology already in place. Some older service stations without technologically advanced pumps will require a thorough replacement. However, retail stations that are already using a Windows-based pump technology will only need to upgrade the existing software. Also, mileage data readers must be installed to communicate with the motorists OBU via short-range radio on all of the service station pumps. Again, the cost of

the mileage data readers will be determined after development of the system. It is estimated at $290 per pump (Oregon Department of Transportation 2005). Currently, Alabama has approximately 2000 service stations statewide that would have to be equipped, should the system go into effect.

The capital costs of the central computer system and database run by ALDOT will also be determined upon development of the system. The Oregon Department of Transportation determined the capital cost of a similar system in their state to be approximately $32 million, assuming 1,800 service stations in Oregon. Oregon also determined their total annual costs to be around $112 million (Oregon Department of Transportation 2005).

The capital costs of the project could be financed through bonds, as explored in Section 4.4.1. The project could be bonded over the long phase-in period and the debt costs recouped in an increase in the mileage fee.

4.1.6 Projected revenue

The first step in projecting the revenue generated for the mileage road user fee is to determine a mileage fee. A starting place for the determination of this fee is to look at Alabama's standard miles per gallon guidelines for accessing motor fuels taxes. According to rules from the Alabama DOR, the miles per gallon standards are (a) transport trucks of three and four axles – four miles per gallon, (b) one and a half ton trucks, two axles – eight miles per gallon, (c) pickups and service trucks – ten miles per gallon, and (d) passenger cars – fifteen miles per gallon (Alabama Department of Revenue 2003).

Based on a mileage standard of fifteen miles per gallon (MPG), the road user fee should be $0.015 per mile. This number is obtained by taking the current fuels tax of $0.18 per gallon and dividing it by the standard miles per gallon of a passenger car, 15 MPG (i.e. $0.18/15=$0.015). Using this standard will result in conservative values, since the actual gas mileage of vehicles is constantly improving.

A consistent sampling of vehicles should be used for calculating estimated revenues. Table 4-2 shows a sampling of Alabama motor vehicles that can be used to estimate the projected revenue for the mileage road user fee. For simplicity purposes, the total number of registered vehicles used for calculations is the total number of 2004 vehicles registered in the state excluding buses, motorcycles and large trucks (United States Department of Transportation 2004). The percent of total vehicles for each vehicle type is adjusted to separate hybrid vehicles, which are included in the recorded vehicle numbers. Based on Highway Statistics 2004, the percentage of vehicles in the U.S. that are hybrids is 0.03 percent (United States Federal Highway Administration 1995 – 2004). In 2003, 0.23 percent of the vehicles in Alabama were alternative-fueled vehicles, not including hybrids. This percentage was found using the 9,870 alternative-fueled vehicles in the state in 2003 (United States Energy Information Administration 2004), compared with a total number of registered vehicles of 4,329,245 (United States Federal Highway Administration 1995 – 2004) (i.e. 9,870 / 4,329,245 * 100 = 0.23 percent). The 0.23 percent of alternative-fueled vehicles is further broken down into (a) liquid petroleum gas (LPG) and compressed natural gas

(CPN) vehicles (0.14 percent), (b) ethanol-fueled vehicles (0.07 percent), and (c) electric vehicles (0.02 percent). The alternative-fueled vehicle percentages are based on the actual number of alternative-fueled vehicles in Alabama in 2002 (United States Department of Transportation 2004) adjusted at a 16 percent annual growth, which was estimated from historical data (United States Energy Information Administration). Since the sampling of vehicles has been altered from the actual vehicles registered, total revenues are for comparison purposes only. Actual revenues will be larger and will include revenues from buses, motorcycles, and large trucks.

Table 4-2. Vehicles sample to be used in revenue calculations for VMRUF

Vehicle Type	Number of Registered Vehicles[a]	% of Total Registered Vehicles	Adjusted % of Total Registered Vehicles[b]	Adjusted number of registered vehicles
LPG & CNG	0	0	0.14	**6025**
Ethanol	0	0	0.07	**2903**
Electricity	0	0	0.02	**681**
Hybrids	0	0	0.03	**1,151**
Automobiles	1,755,000	42.01	41.90	**1,750,480**
Vans	356,000	8.52	8.50	**355,083**
Trucks[c]	1,820,000	43.56	43.45	**1,815,313**
SUV	247,000	5.91	5.90	**246,364**
Total	4,178,000	100 %	100%	**4,178,000**

[a] – Number of registered vehicles in Alabama in 2004 excluding buses, motorcycles, and large trucks (United States Department of Transportation)
[b] – Adjusted to account for hybrid vehicles
[c] – Includes pickups and light trucks

Table 4-3 shows the estimated gross revenue generated using the $0.015 per mile road user fee based on the standard mileage guidelines for the State of Alabama for average vehicle types. Detailed calculations of data contained in the Tables 4-3 through 4-9 are available in Appendix C. There is a substantial differential between the gas tax and the mileage road user fee revenues using this rate, with almost a 66 percent increase in revenue projected. Such a high mark-up might not rest well with the Alabamians on which the new fee structure is being imposed. Therefore, alternative rates should be considered.

A new standard rate must be calculated to allow the revenue amounts to be closer to one another. Table 4-4 shows the calculation of a new MPG standard to be used to determine the VMT rate for the mileage road user fee. The weighted MPGs are determined using the recorded average MPG multiplied by the percentage of the total vehicle sample for each vehicle type. Then, the new MPG standard is determined by summing these averages and dividing by the 100 percent total. Based on these calculations the new MPG standard is 21.1 MPG. Using this new standard, a new VMT rate of 0.9 cents per mile can be determined by using the same procedure as previously noted.

Table 4-3. Vehicle mileage road user fee estimated 2004 revenue with road user fee rate of $0.015 per mile

Vehicle Type	Average MPG[a]	Annual Vehicle Gas Tax[b]	Total Revenue 2004 (gas tax)[c]	Average VMT/year at $ 0.015/mile[d]	Vehicle Mileage Road User Fee[e]
LPG & CNG[f]	21.25	$75.00	$451,895	$193.89	$1,168,240
Ethanol[g]	15.25	$23.39	$67,926	$193.89	$562,955
Electricity	N/A	$0.00	$0	$193.89	$131,972
Hybrid	38.3	$74.30	$85,519	$193.89	$223,181
Automobile	25.1	$94.26	$165,005,861	$193.89	$339,400,564
Van	22.7	$102.86	$36,522,746	$193.89	$68,847,066
Truck	16.8	$143.68	$260,829,003	$193.89	$351,970,955
SUV	22.5	$104.85	$25,832,301	$193.89	$47,767,487
Totals			**$488,795,251**		**$810,072,420**

Note: N/A (not applicable)
[a] – MPG (miles per gallon)
[b] – Gas tax revenue is based on Alabama's $0.18 per gallon tax and an annual vehicle-miles-traveled per capita of 12,926 (United States Federal Highway Administration 1995 – 2004)
[c] – Annual vehicle gas tax multiplied by the number of this vehicle type in the sample group (see Table AAA)
[d] – Annual average vehicle miles traveled (VMT) per capita of 12,926 in 2004 (United States Federal Highway Administration 1995 – 2004)
[e] – Average VMT/year multiplied by the number of this vehicle type in the sample group
[f] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[g] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline

Table 4-4. New miles per gallon standard

Vehicle Type	Average MPG[a]	Weighted MPG average
Alternative-fueled vehicles	18.3	4.2
Hybrid	38.3	1.1
Automobile	25.1	1049.8
Van	22.7	192.6
Truck	16.8	731.4
SUV	22.5	132.7
New MPG standard based on weighted average		**21.1**
VMT[b] fee		**$ 0.0085**
VMT fee (rounded)		**$0.0090**

[a] – MPG (miles per gallon)
[b] – VMT (vehicle miles traveled)

Based on this new standard mileage fee, Table 4-5 shows the estimated revenue expected from imposing the VMRUF. It is easily observed that this rate more closely reflects the current revenue being generated by the gas tax, with a negligible percent difference of less than 1 percent.

Table 4-5. Vehicle mileage road user fee estimated 2004 revenue with road user fee rate of $0.009 per mile

Vehicle Type	Average MPG[a]	Annual Vehicle Gas Tax[b]	Total Revenue 2004 (gas tax)[c]	Average VMT/year at $0.009/mile[d]	Mileage Road User Fee[e]
LPG & CNG[f]	21.25	$75.00	$451,895	$116.33	$700,944
Ethanol[g]	15.25	$23.39	$67,926	$116.33	$337,773
Electricity	N/A	$0.00	$0	$116.33	$79,183
Hybrid	38.30	$74.30	$85,519	$116.33	$133,909
Automobile	25.10	$94.26	$165,005,861	$116.33	$203,640,339
Van	22.70	$102.86	$36,522,746	$116.33	$41,308,240
Truck	16.80	$143.68	$260,829,003	$116.33	$211,182,573
SUV	22.50	$104.85	$25,832,301	$116.33	$28,660,492
Totals			**$488,795,251**		**$486,043,452**

Note: N/A (not applicable)
[a] – MPG (miles per gallon)
[b] – Gas tax revenue is based on Alabama's $0.18 per gallon tax and an annual vehicle-miles-traveled per capita of 12,926 (United States Federal Highway Administration 1995 – 2004)
[c] – Annual vehicle gas tax multiplied by the number of this vehicle type in the sample group (see Table AAA)
[d] – Annual average vehicle miles traveled (VMT) per capita of 12,926 in 2004 (United States Federal Highway Administration 1995 – 2004)
[e] – Average VMT/year multiplied by the number of this vehicle type in the sample group
[f] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[g] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline

However, the preceding calculations were based on the $0.18 gas without adjustments for inflation. Using the new standards and the $0.27 per gallon gas tax that is adjusted for inflation a new rate is determined. The new rate updated for inflation is 1.5 cents per mile, after rounding to the half cent. It should be noted that it is purely coincidental that the new rate is identical to the first computed rate before any adjustments.

Table 4-6 shows the estimated revenue from a $0.015 per mile rate road user fee. Tables 4-7 and 4-8 show the road user fee estimated revenues for future years 2010 and 2020, respectively. All of the tables compare the VMRUF estimated revenue to that of the current gas tax revenue and the inflation adjusted gas tax. The following assumptions were made for the calculations in these tables:

1. Motor vehicle registrations in the state of Alabama will continue to increase at the average rate of four percent per year, as determined from historical data.
2. VMT per capita in the state will continue to increase at an average rate of one percent per year, as calculated from existing data.
3. In the year 2010, the estimated percentage of hybrid vehicles will be five percent, as based on the estimated national average ("Sales Numbers" 2005).
4. In the year 2020, the percentage of hybrids is expected to increase to 15 percent of all registered vehicles (Epstein 2005).
5. Other alternative-fueled vehicles will increase at an annual rate of 16 percent, based on historical data (United States Energy Information Administration 2004).

Table 4-9 compares the gas tax revenues and VMRUF revenues for the three analysis years (2004, 2010, and 2020) using a $0.015 per mile rate as the road user fee. It is obvious from this comparison the dramatic difference between the revenue sources as the hybrid and alternative-fueled vehicle share of the market increases.

Table 4-6. Vehicle mileage road user fee estimated 2004 revenue with road user fee rate of $0.015 per mile

Vehicle Type	Average MPG[a]	2004 Vehicle Gas Tax[b]	Total Revenue 2004 (gas tax)[c]	Inflation Adjusted Annual Vehicle Gas Tax[d]	Inflation Adjusted Total Revenue 2004 (gas tax)[c]	Average VMT/year at $0.015/mile[e]	Vehicle Mileage Road User Fee[f]
LPG & CNG[g]	21.25	$75.00	$451,895	$75.00	$451,895	$193.89	$1,168,240
Ethanol[h]	15.25	$23.39	$67,926	$34.33	$99,671	$193.89	$562,955
Electricity	N/A	$0.00	$0	$0.00	$0	$193.89	$131,972
Hybrid	38.30	$74.30	$85,519	$111.44	$128,279	$193.89	$223,181
Automobile	25.10	$94.26	$165,005,861	$141.39	$247,508,791	$193.89	$339,400,564
Van	22.70	$102.86	$36,522,746	$154.29	$54,784,119	$193.89	$68,847,066
Truck	16.80	$143.68	$260,829,003	$215.52	$391,243,504	$193.89	$351,970,955
SUV	22.50	$104.85	$25,832,301	$157.28	$38,748,451	$193.89	$47,767,487
Totals			**$488,795,251**		**$732,964,710**		**$810,072,420**

Note: N/A (not applicable)
[a] – MPG (miles per gallon)
[b] – Gas tax revenue based on Alabama's $0.18 per gallon tax and annual vehicle-miles traveled per capita of 12,926 (United States Federal Highway Administration 1995 – 2004)
[c] – Annual vehicle gas tax multiplied by the number of this vehicle type in the sample group (see Table AAA)
[d] – Gas tax revenue is based on Alabama's tax, adjusted for inflation to $0.27 per gallon
[e] – Annual average vehicle miles traveled (VMT) per capita of 12,926 in 2004 (United States Federal Highway Administration 1995 – 2004)
[f] – Average VMT/year multiplied by the number of this vehicle type in the sample group
[g] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[h] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline

Table 4-7. Vehicle mileage road user fee projected 2010 revenue with road user fee rate of $0.015 per mile

Vehicle Type	Average MPG[a]	2010 Vehicle Gas Tax[b]	Total Revenue 2010 (gas tax)[c]	Inflation Adjusted Annual Vehicle Gas Tax[d]	Inflation Adjusted Total Revenue 2010 (gas tax)[c]	Average VMT/year at $0.015/mile[e]	Vehicle Mileage Road User Fee[f]
LPG & CNG[g]	21.25	$75.00	$1,546,125	$75.00	$1,546,125	$205.82	$4,242,942
Ethanol[h]	15.25	$23.39	$232,403	$36.44	$361,995	$205.82	$2,044,601
Electricity	N/A	$0.00	$0	$0.00	$0	$205.82	$479,309
Hybrid	38.30	$78.87	$21,680,170	$118.30	$32,520,255	$205.82	$56,579,026
Automobile	25.10	$100.06	$218,153,485	$150.09	$327,230,227	$205.82	$448,719,915
Van	22.70	$109.18	$48,286,553	$163.78	$72,429,830	$205.82	$91,022,387
Truck	16.80	$152.52	$344,840,817	$228.78	$517,261,226	$205.82	$465,339,171
SUV	22.50	$111.30	$34,152,765	$166.96	$51,229,147	$205.82	$63,153,173
Totals			**$668,892,318**		**$1,002,578,805**		$1,131,580,524

Note: N/A (not applicable)
[a] – MPG (miles per gallon)
[b] – Gas tax revenue based on Alabama's $0.18 per gallon tax and annual vehicle-miles traveled per capita of 13,721
[c] – Annual vehicle gas tax multiplied by the number of this vehicle type in the sample group (see Table AAA)
[d] – Gas tax revenue is based on Alabama's tax, adjusted for inflation to $0.27 per gallon
[e] – Annual average vehicle miles traveled (VMT) per capita of 13,721
[f] – Average VMT/year multiplied by the number of this vehicle type in the sample group
[g] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[h] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline

Table 4-8. Vehicle mileage road user fee projected 2020 revenue with road user fee rate of $0.015 per mile

Vehicle Type	Average MPG[a]	2020 Vehicle Gas Tax[b]	Total Revenue 2020 (gas tax)[c]	Inflation Adjusted Annual Vehicle Gas Tax[d]	Inflation Adjusted Total Revenue 2020 (gas tax)[c]	Average VMT/year at $0.015/mile[e]	Vehicle Mileage Road User Fee[f]
LPG & CNG[g]	21.25	$75.00	$3,697,039	$75.00	$3,697,039	$227.35	$11,207,020
Ethanol[h]	15.25	$23.39	$555,713	$40.25	$956,149	$227.35	$5,400,470
Electricity	N/A	$0	$0	$0.00	$0	$227.35	$1,266,015
Hybrid	38.30	$87.12	$106,348,426	$130.68	$159,522,639	$227.35	$277,538,894
Automobile	25.10	$110.53	$317,528,803	$165.80	$476,293,205	$227.35	$653,125,013
Van	22.70	$120.61	$70,282,496	$180.91	$105,423,744	$227.35	$132,485,758
Truck	16.80	$168.48	$501,925,936	$252.72	$752,888,904	$227.35	$677,314,828
SUV	22.50	$122.95	$49,710,352	$184.42	$74,565,529	$227.35	$91,921,298
Totals			**$1,050,048,765**		**$1,573,347,208**		**$1,850,259,296**

Note: N/A (not applicable)
[a] – MPG (miles per gallon)
[b] – Gas tax revenue based on Alabama's $0.18 per gallon tax and annual vehicle-miles traveled per capita of 15,157
[c] – Annual vehicle gas tax multiplied by the number of this vehicle type in the sample group (see Table AAA)
[d] – Gas tax revenue is based on Alabama's tax adjusted for inflation to $0.27 per gallon
[e] – Annual average vehicle miles traveled (VMT) per capita of 15,157
[f] – Average VMT/year multiplied by the number of this vehicle type in the sample group
[g] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[h] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline

Table 4-9. Comparison of gas tax and vehicle mileage road user fee revenues for selected years

Year	Gas Tax Revenue[a]	Inflation Adjusted Gas Tax Revenue	Gas Tax Revenue[b]	VMRUF Revenue[c]	% Difference from Gas Tax Revenue to VMRUF	% Difference from Adjusted Gas Revenue to VMRUF
2004[d]	$488,795,251	$732,964,710	$810,072,420	66	11	$488,795,250.51
2010[e]	$668,892,318	$1,002,578,805	$1,131,580,524	69	13	$668,892,318.00
2020[f]	$1,050,048,765	$1,573,347,208	$1,850,259,296	76	18	$1,050,048,765.27

[a] – Based on Alabama's $0.18 per gallon gas tax
[b] – Based on inflation adjusted rate of $0.27 per gallon
[c] – VMRUF (Vehicle Mileage Road User Fee); Based on $0.015 per mile fee rate
[d] – Assumes 0.04% hybrids, 0.23% alternative-fueled vehicles
[e] – Assumes 5% hybrids, 0.60% alternative-fueled vehicles
[f] – Assumes 15% hybrids, 0.90% alternative-fueled vehicles

4.1.7 Implementation timeline

By using a prolonged phase-in period for the system, an easier transition is expected to be accomplished. During this period, both the mileage fee and fuel taxes will be collected by the state. No driver would be required to pay both. Drivers who are not Alabama citizens and those driving vehicles not fitted with the OBU required would pay the Alabama fuels tax. A long phase

in system would ensure an "orderly and low risk transition" (Oregon Department of Transportation 2005). The Oregon DOT estimates that approximately five percent of vehicles turn over every year. Therefore, the phase-in should take around twenty years to complete.

There are many advantages to phasing in the system over a long period of time, as well as for retaining the gas tax for certain circumstances. First of all, the long phase-in provides a long risk-assessment period and a thorough examination of the system before it becomes the primary revenue source. Additionally, since the gasoline tax will remain a source of taxation for those vehicles not equipped with the OBUs and for out-of-state drivers, the system has a "fall-back" in case of unexpected problems occurring with the new system. In this scenario, the only revenue that would be lost in the case of a system failure would be the differential between the mileage fee payments and the gas tax collections (Oregon Department of Transportation 2005).

4.1.8 Privacy issues

One obstacle to this approach is consumers' perception of OBUs being placed in their personal vehicles. Many users will view this as an invasion of privacy. However, in recent years, consumers have become more open to the idea of "trackable" devices being placed on cars. For example, the OnStar system is gaining popularity. This system uses GPS, global-positioning system, to locate the car in case of an emergency or to give the driver directions. Drivers in other parts of the country already have toll transponders installed in their vehicles to more efficiently pay tolls. Perhaps the most wide-spread example of the public's acceptance of a "trackable" device is the use of cell phones. As long as a user's cell phone is turned on, the company has the ability to track the location of the phone. Although this is well known, almost everyone now has a cell phone. Although the current systems are voluntary, they provide a reasonable expectation that consumers are growing more tolerant of trackable electronic devices in vehicles. Eventually, if the technology provides a value, citizens will stop worrying and become consumers of the product.

The concern for privacy for Alabama motorists is also related to the fear of being tracked by the government. In this circumstance, tracked means that detailed routes and times that a motorist has driven can be produced either in real-time or historically (Oregon Department of Transportation 2005). In real-time tracking, the location and time data is sent to a third party shortly after it is generated. For example, commercial fleets utilize this type of technology to maintain knowledge and control of their assets. In historical tracking, the time and location data are stored by the GPS receiver in such a manner that they can be recovered at a later time.

To address these concerns, the privacy of motorists will be protected by an OBU design that would not allow the movements of the vehicle to be transmitted or monitored. The device used in the OBU for the road user fee would simply log how many miles are traveled within the state of Alabama. The GPS would only be used for the purpose of detecting whether or not the vehicle was in the state. It could also be used in the future for congestion pricing, i.e. to charge a premium on miles driven in prime areas and prime times.

The transmission will be accomplished using a short-range radio frequency. The purpose of using a short-range frequency is to prevent the ability to track the vehicle. According to Oregon State University researchers, the maximum range for radio frequency technology is 300 feet. However, they determined that this technology can be refined to lessen this range to limit transmission to the reader at the fueling pump, therefore preventing data theft (Oregon Department of Transportation 2005). Therefore, the supporting technology for the Alabama mileage fee could be designed so that the OBU device could not be used to track a vehicle, either in real-time or historically.

Although the VMRUF alternative may be met with public resistance at first, a strong campaign to inform Alabamians of the factual nature of the device could soon change public opinion and increase acceptability and support.

4.1.9 Public resistance to mileage fees

Road user fees have been proposed for the last 30 or 40 years. There has been a lack of public support, and in some instances strong resistance, to these taxes. In recent years the resistance has softened in Europe and other international locations.

The Oregon experiment is a noteworthy step forward in the U.S. However, it is a volunteer program, and it appears that drivers switch to it only if they see they will pay less taxes in the long run. There are certainly long revenue gains for state DOTs from such programs, but currently they are more politically difficult to adopt than increases in fuel taxes.

4.1.10 Other advantages and uses for the vehicle mileage road user fee

An advantage to using this system is its ability to transcend its primary use to become more diverse. For example, the system supports adding congestion pricing fees without any additional technology or design. Congestion on Alabama's highways is an increasing problem. On Alabama's urban roadways, the amount of traffic from 1996 to 2001 increased 18 percent. It is predicted that traffic on the highways and bridges in the state will increase another 40 percent by the year 2015. In spite of this increasing trend of congestion, Alabama's urban highways have not been expanded to accommodate the growing traffic volumes. The number of lane miles remained almost unchanged from 1996 to 2001 (Norrell 2005). A premium fee could be charged for vehicles miles driven in certain areas or certain times to encourage drivers to drive at off-peak times. Therefore, the system could be used as a tool to decrease congestion. Again, this is another option that the legislature could adopt once the OBU system is in place.

Additionally, a mutually beneficial arrangement with automobile insurance companies and consumers could be implemented using the OBU tracking of vehicle mileage. In the United Kingdom a pay-as-you-drive insurance plan is being tested. The premise is that motorists are charged insurance fees based on the number of miles driven ("Pay-as-you-drive Car Cover Tested" 2004). Currently, the insurance companies rely on the consumer to report the mileage driven each year. This mileage figure, in part, determines the amount of insurance premium the individual pays. An accurate mileage-based fee could be a desirable option in the future. In this

scenario, the insurance company could charge a rate based on a per-mile rate. Like existing insurance rates, this per-mile rate could be adjusted for age, accident-free driving, and other fee adjusting factors. Support from the insurance companies for this use could enhance public perception.

4.2 Heavy Truck Road User Fee

4.2.1 Overview

The 2000 Alabama Statewide Transportation Plan addressed the need to reevaluate the current fee system for trucks. As truck movement continues to grow in the state, it will be useful to have commercial vehicles paying their fair share for damage to roadways (Alabama Department of Transportation 2000). According to AASHTO research, damage to pavement increases to the fourth power as axle loadings increase (Samuel 2000). Since the majority of the damage and wear on Alabama's roadways comes from large trucks, a Heavy Truck Road User Fee (HTRUF) is an equitable solution to providing the Alabama Highway Fund with additional revenue to maintain and build roadways. The premise of the HTRUF is charging a mileage based fee on heavy trucks that use Alabama's roadways. Trucks are not highly monitored in the state at the present. In fact, Alabama has only one permanent weigh station for trucks in the state ("Pay-as-you-drive Car Cover Tested" 2004), located on Interstate I-20 near the Alabama-Georgia border.

4.2.2 Criteria for being subject to the truck user fee

Currently, certain fees and registration requirements are required for trucks in the state if they fall under the International Fuel Tax Agreement (IFTA). The vehicle requirements for registration under the International Fuel Tax Agreement (IFTA) are found in Title 40, Chapter 17, Section 150 (40-17-150) of the Code of Alabama 1975 (2006). According to Section 810-8-1-.07 of the Motor Fuels Tax Rules, a motor vehicle qualifies under this act if it (a) has two axles and exceeds 26,000 pounds gross vehicle weight, (b) regardless of weight, has three or more axles, and/or (c) is used in combination, and the gross vehicle weight exceeds 26,000 pounds (Alabama Department of Revenue 2003). All trucks meeting these requirements will also be considered in the HTRUF program.

4.2.3 HTRUF implementation

The proposed HTRUF system would be similar to one already being used in Germany, except that the Alabama system will charge trucks based on their VMT in the entire state, not just on a specific type of highway. The truck tolling system would be a free-flow system, in that it can calculate the toll without stopping or reducing the speed of the truck. Each truck will be equipped with an OBU that can record the mileage the truck drives within Alabama. The truck mileage user fee rate can either be a flat fee per mile across all truck classes, or can vary based on emissions class, weight, and number of axles, or a combination of these factors. The OBU will be programmed to calculate the fee due, based on the truck's rate class and the mileage driven. A cellular wireless technology will then be used to transmit the data to a data collection

and payment center. The individual trucks or fleets can be linked to an account where the fee can be deducted.

Truck drivers will be responsible for fitting their vehicles with OBUs. Eventually, these OBUs will become standard on the vehicles, as they can also be used by the fleet owners to manage their fleets and by the driver for navigation. Trucks will be registered for the new system at the time of their annual licensing registration.

Additional stations must be built along Alabama's highways for this system to function. Occasional users who do not obtain OBUs will purchase temporary pre-paid stickers, such as the E-ZPass system tags, at these stations. These drivers will be required to book their planned trip and pre-pay a standard daily amount. The sticker is placed on the inside of the windshield to show that the truck has paid and is in compliance with the truck mileage road user fee.

To ensure compliance, enforcement actions may be necessary. Proposed enforcement techniques include setting up camera along Alabama highways that can transmit license plate data to a central system. The system can then determine if the truck has been registered with an OBU or a pre-paid tag. If not, a fine can be issued through the mail.

The HTRUF system can also be implemented under manual documentation and reporting. Since trucking companies already keep detailed mileage logs, the needed data is already being recorded. The fleet owners would be required to submit monthly reports of their fleet's in-state mileage and pay fees based on these miles. Although this system would be much easier to implement and the capital costs much lower than an electronic system, the potential for tax evasion is much higher. However, this manual procedure might be a good option to implement the system in the beginning, phasing in the electronic options.

4.2.4 Projected revenue

The projected revenues from the HTRUF system implementation are summarized in Table 4-10 and are based on the number of truck miles driven in the state of Alabama in 2002. For simplicity purposes, the projected revenues are based on a flat fee across all vehicle emissions, weight, and axle classes. This information was obtained from Alabama's 2002 Economic Census (United States Department of Commerce 2004). Currently, Germany charges an average of 12.5 eurocents per kilometer ("Germany's High-tech Road Toll System Successfully Launched" 2005), or approximately 24 cents per mile.

4.2.5 Technology

The OBU technology must contain a GPS module, a directory of toll zones and rates, and a mobile communications module. For the Alabama truck mileage user fee system, the proposed zone is the entire state of Alabama. However, in the future the zones and rates can be altered to reflect congestion pricing, if desired. Much like the Vehicle Mileage Road User Fee for vehicles, the technology for the truck toll system should be specifically developed for use in Alabama.

Table 4-10. Projected Revenue from Heavy Truck Road User Fees

Average weight (lbs)	Truck Miles (millions)	Revenue ($) from $0.10 / mile	Revenue ($) from $0.15 / mile	Revenue ($) from $0.20 / mile	Revenue ($) from $0.25 / mile
26,001 – 33,000	173.1	$17,310,000	$25,965,000	$34,620,000	$43,275,000
33,001 – 40,000	49.2	$4,920,000	$7,380,000	$9,840,000	$12,300,000
40,001 – 50,000	123.7	$12,370,000	$18,555,000	$24,740,000	$30,925,000
50,001 – 60,000	173.8	$17,380,000	$26,070,000	$34,760,000	$43,450,000
60,001 – 80,000	1822.6	$182,260,000	$273,390,000	$364,520,000	$455,650,000
80,001 – 100,000	230.0	$23,000,000	$34,500,000	$46,000,000	$57,500,000
Total Gross Revenue		**$257,240,000**	**$385,860,000**	**$514,480,000**	**$643,100,000**

DSRC beacons and cameras will be set-up throughout the state's highways and interstates. These stations will communicate with the trucks OBU prompting it to communicate with the central billing center via cellular technology. The central center will collect the data and bill the owner based on the VMT in Alabama since the last bill. Figure 4-4 illustrates the data and revenue flow for a truck equipped with an OBU. In the case of a prepaid tag, the device will note that the tag is valid. Figure 4-5 shows the data and revenue flow for a truck equipped with a pre-paid tag. If the tag is not valid, or the truck does not have an OBU, a camera will capture the tag number and a fee will be issued. An illustration of the data and revenue flow for a truck in violation of the system is seen in Figure 4-6. Furthermore, technology will be required to detect when a truck is approaching and take the appropriate action.

A thorough and intensive research investigation should be implemented to develop the technology and software specific for this system. A pilot study should also be done to better understand the needs of the system and the technology options.

4.2.6 Capital costs

Capital costs from the HTRUF include costs related to the OBU of the trucks, the additional stations needed along the highways, the DSRC and cameras along the highways, the software and technology development. Capital and ongoing costs also include personnel needed for the additional stations and for enforcement of trucks attempting to evade the checkpoints. It is still premature to determine the actual amount of these capital costs without a better idea of the software developments and exact technology requirements.

4.2.7 Privacy issues

Privacy does not present the same concern for the HTRUF as it does for the VMRUF. Since trucks are a business, the same expectation of privacy is not present. Also, many fleet owners are already installing GPS based OBUs in their trucks to manage fleets, track mileage, and plan routes. Therefore, privacy issues are not really a main concern regarding the HTRUF technologies.

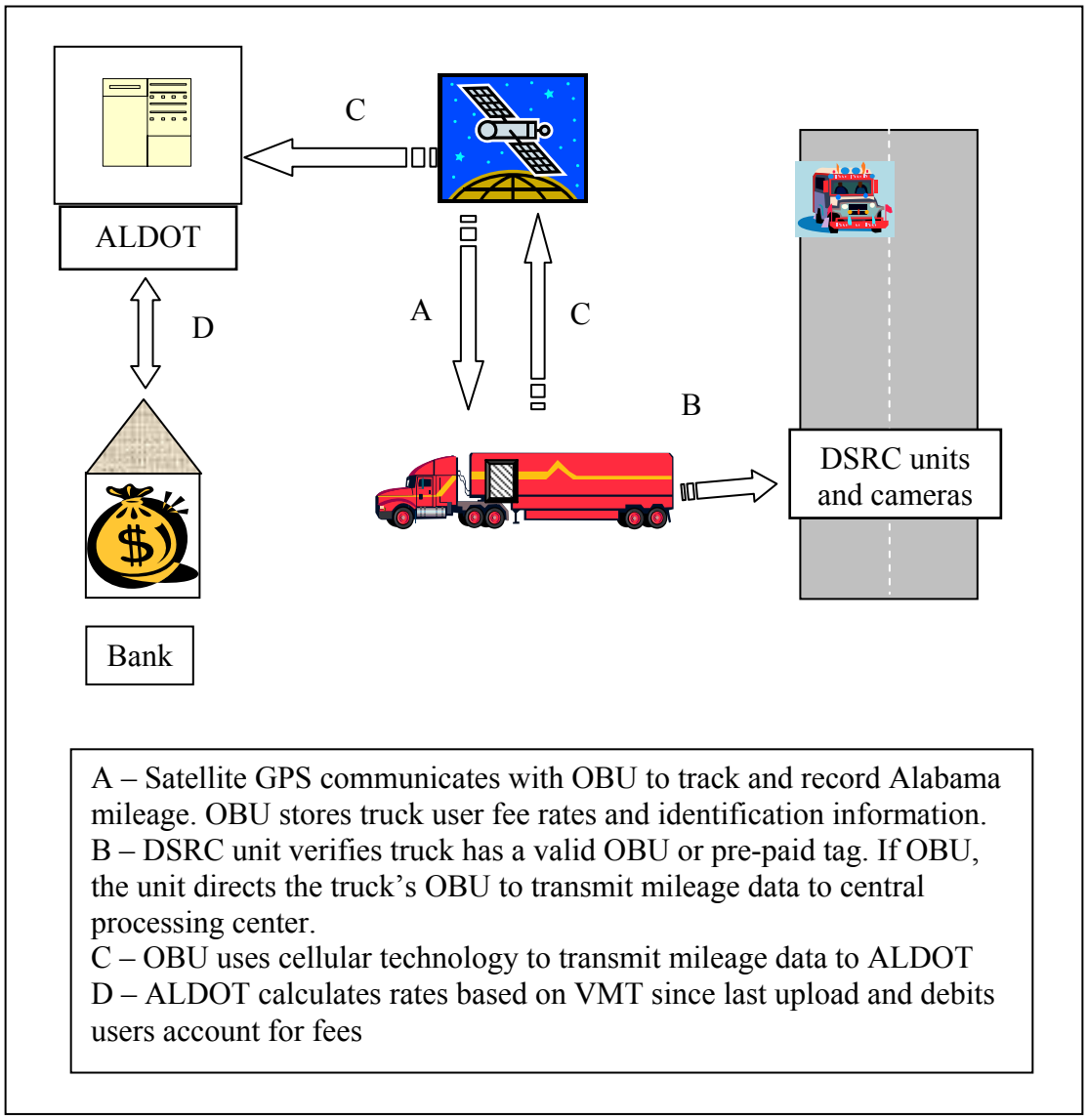

Figure 4-4. Data and revenue flow for heavy truck road user fee (HTRUF) for trucks equipped with on-board units (OBUs)

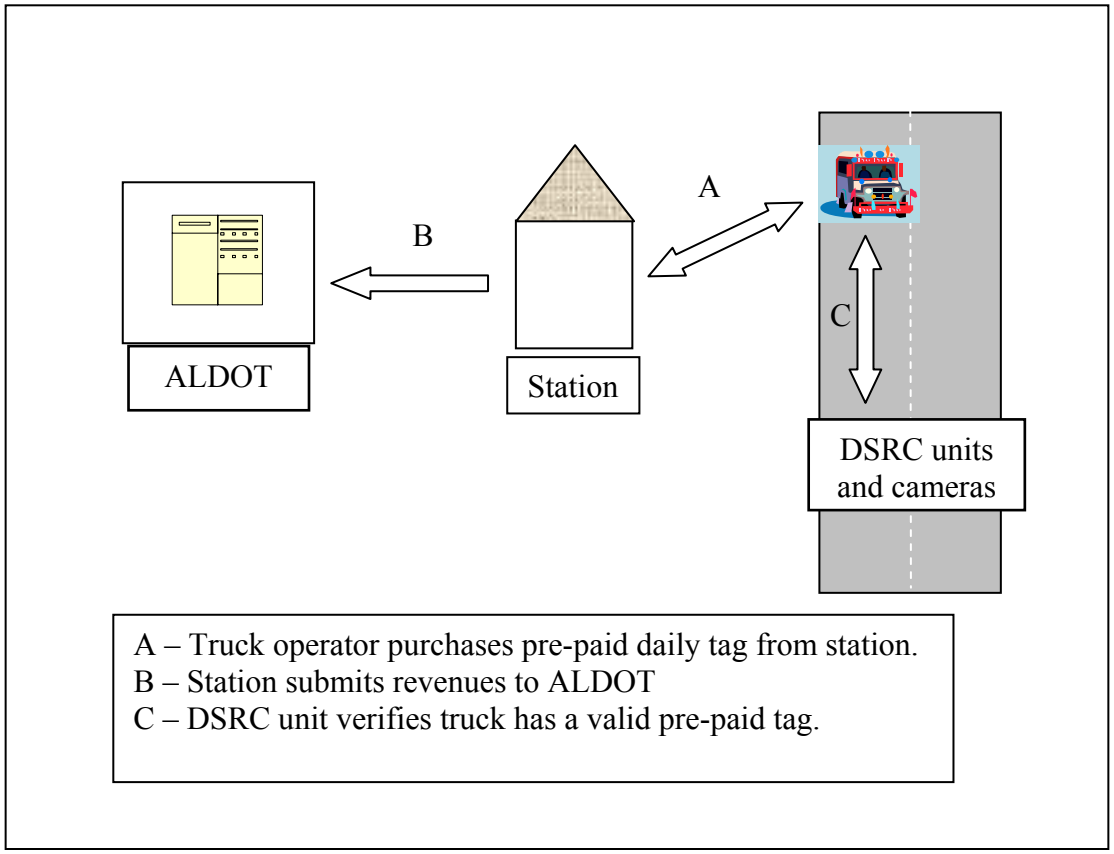

Figure 4-5. Data and revenue flow for heavy truck road user fee (HTRUF) for trucks equipped with pre-paid tag

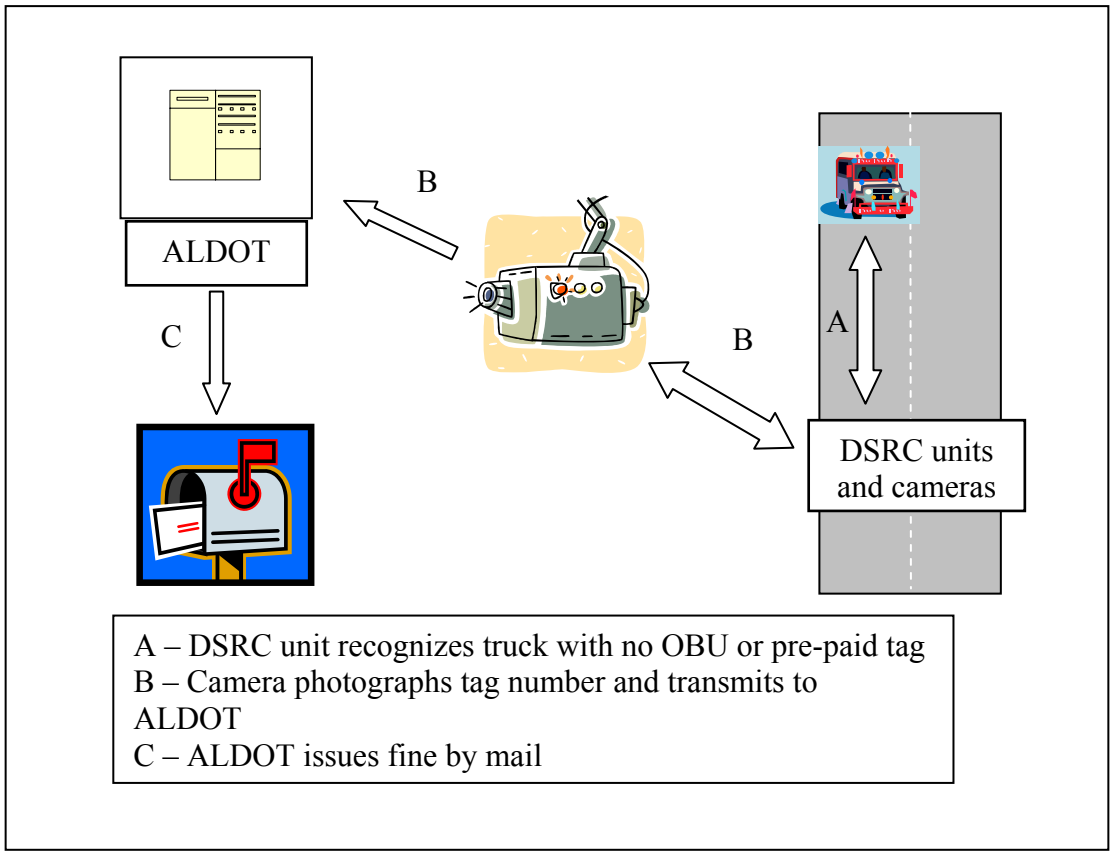

Figure 4-6. Data and revenue flow for heavy truck road user fee (HTRUF) for trucks not equipped with OBU or pre-paid tag

4.2.8 Phased implementation

Heavy vehicle taxes are excellent, rational ways to raise revenue. The most feasible implementation scheme might be to implement them in multiple phases. The best way to start might be by using their self-reported mileage driven in Alabama. Although their reported values are subject to underreporting, putting a small tax in place using this method would avoid large capital costs for electronic equipment and could be more plausible to the legislature. It would also set a precedent. Later, the legislature could be inclined to raise the tax rate or perhaps approve the ideal design described in the preceding section of the report.

4.2.9 Safety and other advantages

Another advantage to a truck toll system is the increased monitoring and awareness of truck presence on Alabama's roadways. Many of the trucks in Alabama are not required to register with the federal transportation officials, because they travel only in Alabama. Currently, it is difficult for inspectors to track these trucks. Alabama is ranked 48th in the nation for the number of truck inspections performed, eighth in the nation for the high rate of truck accidents, and second nationally for fatal truck crashes (Blackledge *et al*. 2005). The truck user fee generate much needed revenue for the state, but perhaps an even more important consequence is the expected improvement in safety of Alabama's roadways. The HTRUF will generate more checkpoints for trucks and will employ enforcement officials to deter evasion of fees. Also, OBUs on the trucks make the drivers more aware that they are being tracked. Simply increasing the perception of awareness of commercial trucks on the roadways will motivate the drivers to operate more safely.

4.3 Toll Roads

The potential revenue earned from toll roads is not being utilized in the state of Alabama. Currently, Alabama has only six miles of toll roads (United States Department of Transportation 2004), three toll bridges and one toll ferry. The roads and bridges are all owned by the private sector. ALDOT does not regulate them, nor does it collect revenue from them. Table 4-11 summarizes the limited toll facilities in the state (United States Federal Highway Administration 2005). While considering options for transportation project funding it is important to determine the amount of revenue that toll roads in the state could generate. This option should be examined on a project-by-project basis to determine the feasibility of being a successful financing option.

4.3.1 History of tolls

Early references to tolls are seen as far back as Greek mythology. The Greek Ferryman, Charon is said to have charged a toll to ferry the dead across the river Acheron ("Toll Road" 2005). In England, the first crossing over the River Thames, called the Old London Bridge, was built in 1209 under a toll concession (Samuel 2000). Tolls were used in the Holy Roman Empire in the fourteenth and fifteenth centuries. In the U.S., the beginning of toll roads was in the 1790s with

the Lancaster Turnpike in Pennsylvania ("Toll Road" 2005). Tolls have long been a device used to generate revenue for highway and bridge projects.

Table 4-11. Alabama toll facilities

Toll Facility	Location	Length of bridge or road[a] (miles)	Electronic Toll Collection Method	Comments
Alabama River Parkway Bridge	Crosses Alabama River in Montgomery	6.91	Infrared laser and Electronic ID card	Private
Black Warrior Parkway Bridge	Crosses Black Warrior River near Tuscaloosa	7.12	Infrared laser and Electronic ID card	Private
Emerald Mountain Expressway Bridge	Crosses Tallapoosa River	2.50	Infrared laser and Electronic ID card	Private
Foley Beach Express	Baldwin County (Foley to Orange Beach)	6.00	Electronic ID card	Private
Mobile Bay Ferry	Crosses Mobile Bay (Dauphin Island to Fort Morgan)	N/A	N/A	ALDOT operated

Note: N/A (not applicable)
[a] – Length includes toll and non-toll portions of roadway

4.3.2 Traditional tolling methods

Toll roads provide an equitable financing solution. The individuals who are using and impacting the roadway are the ones who are funding it. Therefore, the potential for the use of tolls on new projects should be examined. However, due to the abundance of access points on most of Alabama's highways, the price to collect tolls is unrealistic. The possibility that tolls might be collected must be known during the design process of the road not only for funding decisions, but also to meet the unique design requirements for toll roads. The most desirable location for a toll road in Alabama is a vacation destination, such as close to the Gulf Shores area. Vacationers are more willing to pay a toll than an average commuter. However, vacation spots are certainly not the only areas where tolls should be considered. Many roadways can accommodate tolls if they are designed with that consideration in mind.

Traditionally, levying of tolls has been suspended after the initial capital costs of the project have been recovered. However, since operating costs in traditional toll systems are almost as much as capital costs over the lifetime of the roadway, tolls should not stop as soon as the initial capital costs have been recovered (Samuel 2000). Continued revenue flow from toll roads can be used for the ongoing maintenance and improvement of the roadway. Additionally, these funds can be used to support other highway projects and can aid in financing the road and bridge fund as a whole. Once the initial capital costs are paid from toll revenues, the toll can continue to be levied to support maintenance and other project expenditures.

Toll roads could provide relief for congested roadways. Toll collection could act as a disincentive toward the use of high demand facilities as well as generate revenue for construction of alternative routes that can further offer relief to congested roadways such as Alabama Highway 280. As long as motorists recognize that the toll provides value, they will be willing to

pay for the service. Drivers will be willing to pay toll rates for the opportunity to buy a "smooth, uncongested ride and a predictable, quick journey" (Samuel 2005).

4.3.3 Electronic tolling

Electronic collection is the future of tolling and should be considered on all new toll facilities. A traditional toll plaza for a two-lane highway can cost up to $30 million, including tollbooths, buildings, and widening the highway to accommodate the system. Additionally, nearly one-third of the toll revenues will be spent on operating costs, the largest of which is the salary of the operators. By comparison, an electronic toll plaza is more cost efficient as it can handle the same number of cars, but costs only around $150,000 to build and uses only one-tenth of toll revenues for operating costs ("The Road Tolls for Thee" 2004). In fact, a transition from traditional stop-and-pay tolling to electronic toll collection is already occurring. The Oklahoma Turnpike Authority, which made the transition in 1990, reported a 91 percent decrease in the cost of toll collection (Samuel 2000).

All of the toll roads and bridges in Alabama are utilizing electronic toll collection technology, and it is recommended that any new toll facilities that are created should also use electronic tolling features. Electronic tolls are favorable options for motorists, because of the speed and convenience of use. They also are beneficial to ALDOT because of the decreased operating costs and thus increased revenue generated.

4.3.4 Safety

Toll roads are safer roads. On average, the accident rate on toll roads is one third less than on non-toll roads. Electronic tolling facilities are even safer than traditional facilities. The Oklahoma Turnpike Authority was one of the first users of electronic tolling when the system was implemented in 1990. The transition to electronic tolling in that state lead to a 100 percent decrease in toll plaza accidents (Samuel 2000).

4.3.5 Value pricing

The FHWA has been issuing grants for a pilot program to test a concept known as "value pricing." Value pricing is also known as congestion pricing, or peak-period pricing. The main staple of this concept is to charge tolls that vary based on the time and congestion in the area (United States Federal Highway Administration 2001). The main difference between value pricing and regular tolling is the variability of the toll rates. Peak periods, such as rush hour, have higher toll rates. This variable pricing approach tailors the rate of the toll to the benefits and value of the trip. The time savings during rush hour are more valuable (Samuel 2000). This concept of higher prices associated with peak periods is already being used in other industries. For example, the hotel industry charges increased prices for travel during peak tourist seasons, and airlines offer discounts for off-peak travel ("Pay-as-you-drive Car Cover Tested" 2004). The idea is that value pricing will encourage drivers to drive during alternative times, if possible.

Value pricing has benefits that surpass merely the generation of additional revenue. Potential benefits of value pricing include (a) decreased congestion, (b) decreased delays, (c) more efficient route and travel choices in motorists, (d) revenue generation, and (e) environmental benefits (United States Federal Highway Administration 2001).

Since the FHWA provides funding for the pilot program, ALDOT may consider participating in this initiative. Funds for the pilot program can be used for pre-project study costs, as well as implementation costs of the program. Pre-project study costs include (a) impact assessment modeling, (b) development of evaluation plans, (c) public participation, (d) market research, and (e) financial planning. Implementation costs include (a) costs associated with the implementation of electronic tolling equipment, (b) enforcement costs, (c) costs of monitoring the system, (d) costs of providing new or expanded transportation alternatives, and (e) costs to be used as revenue reserves to assure that the pilot tests would not put and bond promises at risk ("Germany's High-tech Road Toll System Successfully Launched" 2005).

4.3.6 Toll revenue to leverage funds

Revenue collected from toll roads can also be used to leverage funds. TEA-21 allowed toll revenue to be used as a credit toward the non-Federal matching chare of some transportation projects. The credit can extend the Federal obligation on these projects to 100 percent if the credits from toll revenue are available (United States Federal Highway Administration 2002). The requirement for this type of federal credit is that the toll revenue must be used to build or improve public interstate highways. To qualify for this credit, the state must also meet the maintenance of effort (MOE) test. This test states that the state's total non-Federal highway and transit capital payments must either equal or surpass the average of the previous years (United States Federal Highway Administration 2002). Therefore, toll road revenue could not only bring in income for ALDOT, but could also be used to match federal funds.

Leveraging of funds is not limited to federal funds. Revenues from toll roads also increase the ability to fund large scale projects. Tax revenues are usually not available in large lump sums to support large building projects. The revenue stream from a toll can produce capital to build more quickly and efficiently (Samuel 2000). Also, the toll road revenue can be used as a guarantee on the issuance of bonds, which provide a more immediate capital source.

4.4 Private Funding

4.4.1 Private ownership of highway projects

In the Alabama Statewide Transportation Plan of 2000, a recommendation was made to "utilize private partnerships whenever possible in developing roadway infrastructure, such as toll roads serving as urban bypasses and alternatives to congested parallel corridors" (Alabama Department of Transportation 2000). The main attraction to using privatization is the large infusion of capital into the highway fund that it can provide.

From an investor's standpoint, the return on capital is the most important thing to look at before deciding whether or not to invest in a highway project. Investors will want to determine the net present value (NPV) of the future revenues generated from the project to the cash value of the capital investment. If an adequate return on capital exists, private investors can provide significant capital for highway projects (Haugeberg, *et al.* 1994).

Privatization offers many potential benefits for ALDOT. Private sector funding affords greater flexibility to identify funding sources and arrange financing. Private citizens and companies do not have the strict guidelines and restrictions on financing sources that ALDOT faces. There also exists the advantage of efficiency in procurement, design, construction, and operations of highway projects funded by the private sector. More efficiency will almost certainly guarantee more revenue, because the motivation driving private sector investment is making a profit. Privatization results in more innovations in design and construction, as well as more efficient operating technologies. Projects funded by the private sector save time and money due to use of less strict bidding and contracting methods (Haugeberg, *et al.* 1994). Additionally, investors will seek to provide reasons for the road to be traveled. Increases in area businesses and stimulation of the local economy are secondary advantages to the privatization of the toll road.

Privatization of roadways also has advantages for motorists. Investors who have vested interests in the profitability of a road are more active in ensuring that the road continues to attract traffic throughout its life (Samuel 2000). Therefore, improved maintenance of the roadway and improved customer service are expected form the private sector. In the case of a toll road, the customer is paying for a service and the private company is providing that service (Samuel 2005). This is contrast to the idea of paying taxes, which carries no connotations of receiving a good service.

4.4.2 Bonds for funding highway projects

Bonds can generate revenue to accelerate the construction of highway projects. States such as Arizona already use bonds to generate money for the highway system. The bonds issued in Arizona are called HURF bonds. These are not obligations to the State of Arizona, but are obligations directly to the State Transportation Board. All pledged revenues for the bonds are deposited into the State Highway Fund (Arizona Department of Transportation 2004).

Common forms of bond financing are Grant Anticipation Revenue Vehicles (GARVEEs) which can also be used to leverage federal funds. GARVEEs use federal highway funds as the primary source of repayment for the bond debt (Texas Department of Transportation 2001). Some of the benefits associated with using GARVEE bonds to finance projects are as follows:

1. By acquiring the capital funding for a project in a lump, up-front sum, the project can be started and finished more quickly.
2. Better management of funds is seen because smaller projects are not adversely affected by the funding required for a large project.
3. Construction cost inflation is avoided by starting and finishing the project more quickly with the more immediate funds. Even with interest costs on the bonds, the savings can still be substantial (Texas Department of Transportation).

There are also some disadvantages to GARVEE bonds, including the following:

1. Repayment of bonds is a long-term commitment, and federal and state funds must be used to repay these bonds well into the future.
2. If bonds are over used, the DOT may need to increase staff to manage the growing construction program. A larger staff means a larger payroll.
3. The availability of federal funds for future repayment is uncertain and is subject to periodic renewal by the U.S. Congress. Therefore, guaranteed funding amounts cannot be relied upon, even though federal funds are the basis of repayment of GARVEEs (Texas Department of Transportation).

An advantage of issuing bonds is that it spreads out the cost of a highway project over the lifetime of the bond. However, bonds do incur the additional cost of interest expenses.

4.4.3 Privately funded toll roads

Toll roads can also fall under the category of private funding. Under TEA-21, a portion of federal funds can be used to finance the construction of toll roads and bridges (Alabama Department of Transportation 2000). The matching amounts could be collected through bonds to be repaid through the tolls collected on the roads. This is an efficient manner of funding a specific roadway. Several states, including Arizona, California, Florida, Texas, Virginia, and Washington, have already authorized legislation providing for private toll projects (Haugeberg, *et al.* 1994). As of May 2005 in the U.S., there was around $20 billion of new private sector toll projects either in the permitting process or in the final stages of negotiation with plans to begin construction within the next two years. Internationally, toll roads built by private investors are much more commonplace than in the U.S. In some countries privatization has become the conventional method of financing new roads (Samuel 2005). In fact, there are a number of private-sector companies that specialize in owning and operating toll facilities around the world. ACS is one of the largest of such companies in Europe with ownership of toll roads in Spain, the United Kingdom, Ireland, Argentina, Chile, and South Africa. Additionally, Autostrade, a toll motorway operator in Italy, owns and operates over 2,080 miles of toll roads, which is about half of Italy's entire roadway network (Samuel 2005).

Privatization of toll facilities reduces the extent of political interference and creates a more customer-related business focusing on the profits the road can generate. Toll facilities owned by investors are in a better position to leverage land development along the road corridor and to coordinate development with the road design (Samuel 2000). This means more users to the roadway and consequently, more profit to the investors. The public may be more accepting of a privately-owned toll road as well. There are few who question the need for a business to charge for its services. Alternatively, many are opposed to a government assessed user fee (Samuel 2000).

Most government entities are under the mindset of recovering costs and not generating additional revenue. This is because it may actually cause the entity to receive less money in the state budget

the following year if it is operating with a surplus. According to the Reason Foundation, "Profit-making is just not recognized as legitimate for government agencies" (Samuel 2005).

In order to offer privatization of a roadway, an agreement should be executed between ALDOT and the investor-owned groups to design, finance, build, and operate the road. In return the private agency has the right to collect tolls from motorists for a pre-determined amount of time. Traditionally, the length of such a term has been the length of most long-term bonds, 35-years (Samuel 2005). However, this term length is open to adjustment. At the end of the term, the private group must turn the roadway over to the state in good condition, and ALDOT can begin to collect the toll revenue exclusively. Toll rates should also be addressed in the contract. ALDOT can require that the rate be set by a state regulatory body. The rate may be fixed or allowed to increase with inflation (Samuel 2005).

4.5 Inspection Fees

Inspection fees are imposed on vehicle users to ensure the vehicle is maintained in a way that promotes safety and environmental health. Inspection fees also generate much needed revenue for the highway fund. Because of the benefits of vehicle inspections, this is an option that should be seriously considered.

4.5.1 Inspection fees in other states

Inspection fees ranging from $5 to $100 are already being utilized to provide revenue to DOTs in several other states. A breakdown of some of these states' inspection fees and the portion that goes to the DOT can be seen in Table 4-12.

Table 4-12. Inspection fees charged by various states

State	Fee	Amount to station	Amount to DOT
Georgia	$100	$0	$100
Virginia	$15	$0	$15
Mississippi	$5	$3	$2
North Carolina	$9	$8	$1
Maine	$7	$5	$2
Massachusetts	$29	$20	$9
New Hampshire	$20	$19	$2
New York	$35	$10	$25
Louisiana	$10	$6	$4
Texas	$13	$8	$5
Missouri	$7	$0	$7
Washington D.C.	$10	$0	$10

4.5.2 Environmental issues

Federal policy promotes the development of a transportation system that is environmentally sound (Alabama Department of Transportation 2000). Although most federal regulations are intended for project-related environmental impacts, the inspection of vehicles would address this issue in a much broader way. The ability of the state to comply with federal air quality standards and conform to the Clean Air Act Amendments (CAAA) of 1990 becomes more difficult as the population continues to grow and the use of vehicles increases (Alabama Department of Transportation 2000). Although the population of the state continues to grow steadily (Figure 4-7), only minimal programs have been implemented to address the concern. The actual populations in Figure 4-7 are taken from the U.S. Census Bureau data for 1900 – 1990 (United States Census Bureau 1995) and 2000 (United States Census Bureau 2000) and projected into the future to year 2050. According to the Environmental Protection Agency, about half of the ozone pollution and almost all of the carbon monoxide air pollution in U.S. cities is generated from cars and trucks (North Carolina Department of Transportation 2006a). The few programs that have been implemented in the state of Alabama to address environmental concerns are limited to the Birmingham metropolitan area, which is designated as a marginal non-attainment area for found-level ozone (Alabama Department of Transportation 2000). These programs include a set of Transportation Control Measures (TCMs), such as introducing park and ride lots, establishing Transportation Management Associations (TMAs), and developing programs related to walking, bicycling, and transit. ALDOT recognizes its important role in maintaining vigilance in developing transportation programs that promote compliance with environmental standards (Alabama Department of Transportation 2000). An inspection fee regulating emission is a broad step in ensuring compliance with environmental regulations and establishing a healthier and cleaner environment for Alabama citizens.

4.5.3 Vehicles required for inspection

An inspection fee in Alabama, besides generating revenue, could promote safety and environmental cleanliness. Therefore, vehicle inspections should be divided into two categories, i.e. safety testing and emissions testing. Safety testing includes inspection of the following items on each vehicle: horn, windshield wipers, mirrors, steering, seat belts, braking system, tires and wheel assembly, exhaust system, gas cap, headlights (including high beams and high beams indicator), tail lights (including stop and brake lights), turn signals, vehicle identification number (VIN), window tinting and coating, and proof of insurance.

Research indicates that the majority of vehicle-related carbon monoxide and ozone-forming hydrocarbons are emitted from passenger cars and light trucks, accounting for nearly half of the air pollution in U.S. cities (North Carolina Department of Transportation). It is recommended that all cars and light-duty trucks, including vans and SUVs, registered in the state be tested annually for safety. Additionally, all vehicles registered in the top six counties according to population will be required to have emissions testing as well. These counties include Jefferson, Mobile, Madison, Montgomery, Tuscaloosa, and Shelby counties (United States Census Bureau 2001). The following vehicles will be exempt from emissions testing:

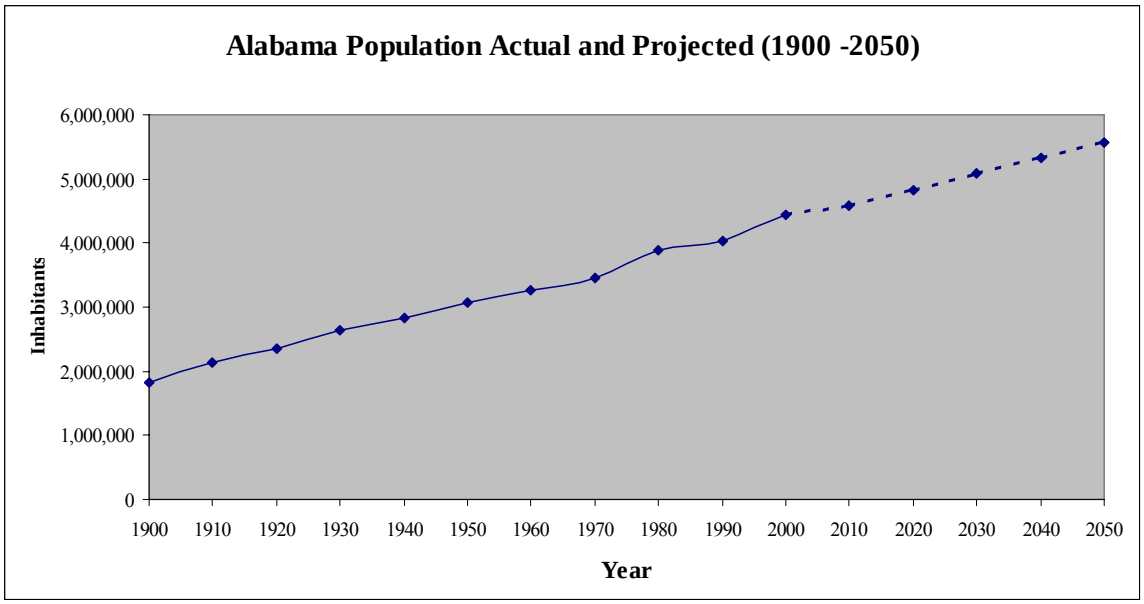

Figure 4-7. Alabama population actual and projected (1900 – 2050)

1. Vehicles not registered in the top six population-ranked counties are exempt.
2. Alternative fuels vehicles (such as those powered by natural gas, propane, and electric) and diesel fueled vehicles will be exempt from emissions testing.
3. Antique and collector vehicles, vehicles that are 25 years old or older, are exempt from emissions testing.

Eventually, the emissions testing can be phased in to include the entire state, but the priorities from an environmental standpoint are the locations in the state with the highest density of population.

4.5.4 Alabama inspection fee projected revenue

Even a small inspection fee can bring in significant revenue for Alabama's highway fund. Table 4-13 shows a breakdown of three levels of inspection fees and distributions. The 2004 and 2005 gross revenues to ALDOT from these options are based on the passenger vehicle and light truck registrations reported by ALDOT. From October 2003 to September 2005, 3,921,768 passenger vehicles and light trucks were registered in Alabama (Alabama Department of Revenue 2004a). During the same period the following year, 4,543,361 vehicles were registered (Alabama Department of Revenue 2005). With a small $15 inspection fee, $10 of which would go to the ALDOT and $5 of which would be given to the station conducting the inspection, over $45 million dollars in gross revenue can be generated for the DOT. Depending on the amount that legislators and taxpayers feel comfortable with, the fee can provide an equitable revenue source for the highway fund.

Table 4-13. Proposed inspection fee revenue

Proposed Fee	Amount to station	Amount to DOT	10/03 - 09/04 ALDOT Revenue	10/04 - 09/05 ALDOT Revenue
$5	$2	$3	$11,765,304	$13,630,083
$10	$5	$5	$19,608,840	$22,716,805
$15	**$5**	**$10**	**$39,217,680**	**$45,433,610**

Each station conducting vehicle inspections will be approved by ALDOT and required to maintain certification. Only certified inspection stations will be permitted to issue inspection reports. Although the $5 portion of the fee that goes to the station seems small, the station will benefit in other ways, such as in procuring new customers. Although it may seem tempting for a station to exaggerate problems in order to make more money from the customer, the certification system should deter such practices. Alabama citizens will be encouraged to report any such unfair practices by the inspection stations to ALDOT. In part, operating honestly and with integrity will be a requirement to remain certified. As seen in Table 4-12, designation of similar amounts of money to the inspections stations has proved successful in other states.

Certain approved stations will perform safety and emissions inspections and provide a "passing" certificate to the vehicle owner. The owner will have to present this certificate at the time of annual vehicle registration in order to register the vehicle. Any vehicles not passing inspection can receive a thirty day temporary registration until all necessary repairs have been made. The cost for the retesting of a vehicle within thirty days of a failed inspection will be $5, all of which will go to the station. Inspection stations can choose to waive this $5 fee if desired, perhaps for motorists who use the station for their repairs.

4.5.5 Vehicle Testing Procedures

The following procedure details the specifics of vehicle safety inspection:

1. The horn should be tested to ensure proper working condition and so that it can be heard at an acceptable distance from the vehicle.
2. The windshield wipers should be turned on and tested for proper operation and good condition.
3. All mirrors should be inspected for proper mounting, location, condition, and unobstructed view. There should be at least one mirror that provides the driver a view of the highway to a distance of 200 feet to the rear of the vehicle (Texas Department of Public Safety 2005).
4. The steering system should be inspected for excessive wear and proper working condition.
5. Seats belts should be installed and properly working in the front seat(s) of all vehicles. Mandatory seat belts are required by Section 32-5B of Alabama Code (State of Alabama 2006).
6. The braking system of each vehicle should be inspected for excessive wear and proper working condition.
7. Tires and the wheel assemblies should be inspected for excessive wear and proper assembly.

8. The exhaust should be checked to verify that the vehicle has a muffler in good working condition. All other exhaust parts should be inspected for excessive wear and proper assembly.
9. The proper type of gas cap should be on the vehicle.
10. The headlights of the vehicle should be inspected for proper operating condition. At least two head lamps should be on the vehicle in proper working order. The beam indicator should be checked for proper operation.
11. The tail lights of the vehicle should also be inspected. At least two red tail lamps should be in proper working order. Every vehicle should also be equipped with at least two red stop lamps that indicate the application of the brake.
12. Turn signal lamps should be inspected for proper mounting and use on both the front and back of the vehicle.
13. Vehicles with altered or removed Vehicle Identification Numbers should be reported to ALDOT.
14. Window tinting and reflective material should be inspected to meet the Alabama window tint law, Alabama code 32-5C, which went into effect on August 15, 1996. All passenger cars should have tinting that allows at least 32 percent light transmission and reflective material that reflects no more than 20 percent of the light. SUVs, pickup trucks, and vans are permitted to have tinting on windows behind the driver (State of Alabama 2006).
15. All vehicles in the state are required to maintain car insurance as outlined in Alabama Code 32-7A (State of Alabama 2006).

Emissions testing should be done for the carbon monoxide and hydrocarbons being released from the exhaust system. An analyzer probe inserted into the tailpipe will conduct the emissions test (North Carolina Department of Transportation 2006b). The levels of carbon monoxide and hydrocarbons acceptable for passing should be determined by law and policy makers.

After completing an inspection, the owner will receive a certificate of passing that must be presented at the Department of Motor Vehicles in order to complete the annual registration of the vehicle. Any vehicle that has not received a passing inspection certificate, except for special circumstances such as low income waivers, will not be permitted to register the vehicle.

4.5.6 Obstacles and concerns to implementing inspection fees

Environmental justice in transportation requires that projects financed in whole or part by the federal government should not negatively impact low-income and minority communities disproportionately. This concept was first put into the transportation code in TEA-21, enacted into law in June 1998 (Alabama Department of Transportation 2000). Although this federal concept is enforced on a project-by-project basis, it is an important concept that should be broadly applied to all level of transportation projects and funding. Therefore, it is important to address the impact of an inspection fee on low-income Alabamians that will be impacted prior to widespread implementation.

The main problem in implementing an inspection fee in Alabama is this disproportional hardship placed on the lowest income families in the state. Inevitably, higher income Alabamians will

have newer vehicles and are more likely to pass an inspection than lower income ones. This means that a burden will be placed on the already struggling lower income drivers to bring and maintain their cars to pass an inspection. Therefore, consideration of the burden placed on these citizens should be an important factor in implementing inspection fees as a revenue source.

The system can be designed to accommodate low income motorists. For example, an inspection waiver can be provided under certain circumstances. If a low-income Alabamian's vehicle has failed the inspection, a quote for repairs should be obtained. If the cost of repairing the vehicle is over a specific amount determined based on the individual's income, an inspection waiver can be issued. Further economic study to determine repair and income levels should be conducted for this option.

4.6 Increase of Current Fuel Tax

Raising the current fuel taxes is also an option to be explored for generating additional revenue for highway projects. As stated earlier (Figure 3-5), Alabama's 18 cents fuel tax rate has not increased since 1992 and is below the national average. If this tax had been indexed for inflation, the rate would be 27 cents per gallon today. A number of advantages and obstacles were identified associated with this option. A great advantage is its simplicity and the fact that no start-up costs are required, because this system is already in place. Actually, this is the only financing option that does not have additional capital costs and can provide a substantial infusion of revenue into the highway fund. One obstacle associated with this system is the absence of public support. Alabama voters are extremely reluctant to vote into law any new or increased taxes. A solution to this is to implement a public campaign urging Alabama citizens to support an increased tax to maintain the roadways. Given the facts, the voters may see that in order to have the properly maintained and updated roadways that are desired, increased taxes are required to fund the projects.

4.6.1 Projected revenue for an increased fuel tax

Table 4-14 shows the projected revenues under the increased fuels taxes scenario. The current gas tax rate of 18 cents per gallon is shown along with a projected fee of 20 cents per gallon, 27 cents per gallon, and 30 cents per gallon. The numbers of gallons used for the calculations in Table 19 are taken from Alabama Department of Revenue figures. Based on these figures, the gasoline sold in Alabama in fiscal year 2003-2004 was 2,536,844,830 gallons, and other motor fuels (i.e. diesel fuels) was 758,316,052 gallons (Alabama Department of Revenue). Adjusted for inflation, today's tax rate should by 27 cents per gallon. As shown in the table, just adjusting the tax rate for inflation produces an increase of almost fifty percent in revenues. Further increasing the rate an additional three cents per gallon to account for inflation, to $0.30 per gallon, in the immediate future results in a 65 percent increase in current revenue.

Table 4-14. Projected Revenue for Increased Fuel Taxes

Category	Gas Tax ($/gallon)	Diesel Tax ($/gallon)	Gasoline	Diesel	Total	% Increase from Current Amount
Current AL tax	$0.18	$0.19	$456,632,069	$144,080,050	$600,712,119	
Projected Taxes	$0.20	$0.21	$507,368,966	$159,246,371	$666,615,337	11.0
	$0.27	$0.28	$684,948,104	$212,328,495	$897,276,599	49.4
	$0.30	$0.31	$761,053,449	$235,077,976	$996,131,425	65.8

5.0 Evaluation of Available Financing Options

5.1 Summary of Available Options

Eight available options for generating additional revenue for highway financing in Alabama were identified and reviewed in great detail. These include: (a) the Vehicle Mileage Road User Fee (VMRUF), (b) the Heavy Truck Mileage User Fee (HTMUF), (c) Publicly-owned Toll Roads, (d) Privately-owned Toll Roads, (e) Private funding using bonds, (f) Road User Congestion Fees, (g) Inspection Fees, and (h) Increased Fuels Tax. A summary and evaluation of these options for implementation in Alabama is presented in the following paragraphs.

The Vehicle Mileage Road User Fee (VMRUF) is the most ambitious and technologically demanding of the financing options considered. However, VMRUF has the ability to become a reliable revenue source for Alabama's highways. GPS and odometer technology, combined with custom software and database package, can sustain the system. Alabama motorists will pay a fee based on their VMT, instead of a fuel tax based on the gallons of fuel purchased. A $0.015 per mile rate is suggested upon implementation of the system, which can be adjusted for inflation in the years to come. Based on this rate, ALDOT can expect a 66 percent increase in revenues over the fuels tax collected at the present. Taking into account the increased number of hybrids projected in the market, the percent increase of the VMRUF revenue over the fuels tax revenue increases to 76 percent by the year 2020. The most important feature of the VMRUF is its sustainability. No matter what type of fuel a vehicle is powered by, it is driving and accumulating miles on Alabama's roadways. This is also an equitable solution in that the fee system will charge users based on how much they use the road.

The Heavy Truck Road User Fee (HTRUF) is also an ambitious option. Like the VMRUF, an investment in technology and research will be required before this system can be implemented. However, charging a user fee to heavy trucks is an ideal solution to generating revenue for the maintenance and construction of Alabama's highways. Trucks cause substantially more damage to the roadways than ordinary passenger vehicles. Therefore, it is an equitable solution that the heavy trucks pay a higher fee to use the roads. All trucks will be required to either have an OBU installed on the vehicle or purchase pre-paid daily tags, which work like E-ZPass tags for tolls. The OBUs will store the mileage driven in the state and charge a fee based on this mileage. The mileage fees discussed here range from $0.10 per mile to $0.25 per mile. Germany, which has already implemented this innovative system, uses a rate of 24 cents per mile. At a rate of $0.25 per mile, the gross revenue for ALDOT is substantial at over $643 million per year. Additional study and technology development is required for this option.

The relatively small number of current miles of toll roads and toll bridges are all owned by the private sector, but in some circumstances public ownership (ALDOT) might be appropriate. Toll roads are a resource that is used abundantly throughout the country and the world. The advantage

of toll roads is the fairness of the system. Only those motorists who actually use the road pay the toll for the road. It is easy for drivers to see the direct correlation between the toll fee and the construction and maintenance of the road. Electronic tolling is the best technique in which to collect tolls. Electronic tolling is more efficient for the motorists and more cost efficient for ALDOT. Research also shows that toll roads are safer roads, and increased safety is always a welcome benefit.

Privately owned toll roads are an even more desirable than their public counterparts. There are added advantages to allowing and promoting private ownership of toll roads. Private owners have much broader and quicker access to capital funds. Therefore, construction on projects can begin and finish faster. Also, any toll road is run like a business for profit. Thus, it is expected to run more efficiently and generate more profits.

Privately issued bonds are another way to fund highway projects. Bonds provide more immediate revenue flows so that construction projects can begin more quickly. Highway financing using bonds has both advantages and disadvantages. Funding using bonds has the added cost of an interest expense on the bonds. However, rising construction costs and inflation mean that the sooner a project is started the more money can be saved, especially from a time-value of money standpoint. Another advantage of bonds from ALDOT's perspective is that the costs of construction are spread out over the life of the bonds.

Road user congestion fees fall under the categories of tolls and VMRUFs. Congestion fees are increased rates on either tolls or mileage fees during periods of high congestion. Congestion fees can be used as a tool to decrease congestion while collecting revenue for the maintenance of the increasingly damaged roadways. The study and development of value pricing, which is a specific form of congestion pricing, is being promoted by the federal government. Alabama can take advantage of federal funds that are available to implement pilot projects using value pricing.

Inspection fees provide a funding solution with added benefits. Vehicle inspections promote safety as well as environmental cleanliness and awareness. Emissions testing in highly populated areas will help the state to maintain compliance with the Clean Air Act as the number of vehicles on the road rises. Inspection fees provide more than just added revenue for the state. The capital costs are minimal, compared to those of the VMRUF and HTRUF systems, and the gross amount of revenue that can be generated for the state is around $20 million. Unlike the VMRUF, this revenue is not in the place of the fuels tax, but rather it is in addition to it. Therefore, this revenue source can be combined with either the fuels tax or the VMRUF system to increase the amount of money coming in to the highway fund. Implementing a $15 inspection fee, $10 of which would go to ALDOT and the reaming $5 to the service station performing the inspection, would have generated over $45 million in gross revenues in the 2003 – 2004 fiscal year.

Finally, increasing the fuels tax is still an attractive option for the immediate future. While additional planning and studies are required for the implementation of the other methods mentioned, the fuels tax infrastructure is already in place. The only actions needed to increase the tax are by the legislature and the voters. The current gas tax is well below the national average and has not been adjusted for inflation. Raising the tax from $0.18 to $0.27 per gallon

would increase revenues by over $297 million annually. However, this scenario will require an intense public relations campaign in order to increase taxes by such a substantial amount all at once.

5.2 Innovative Finance Solutions

There are four main objectives of innovative finance according to the FHWA as follows (United States Federal Highway Administration 2001):

1. Maximize the ability to leverage federal funding.
2. Utilize existing funds more effectively.
3. Begin construction on projects more quickly than under traditional financing.
4. Make funding possible for major transportation investments that might not otherwise be possible to receive financing.

In order to be considered an innovative finance solution, one or more of the preceding criteria should be fulfilled. Table 5-1 summaries the solutions researched on this project and their roles as innovative finance solution.

Maximizing the ability to leverage federal funding can essentially get more projects done for the current amount of ALDOT funding. Toll roads can leverage federal funding because revenues generated by tolls can be used as credits towards the state's required portion to match federal funds. Bonds can use anticipated federal funding as a guarantee on the bonds. Congestion charges can leverage federal funds by taking advantage of the federal value pricing program which provides funding to states wishing to test the value pricing scheme.

Publicly owned toll roads and fuel tax increases both utilize existing program structures more effectively. Publicly owned toll roads are managed more effectively and therefore generate more revenue and decrease operational costs. This means more if the existing funds are available for other highway projects. Additionally, raising the fuels tax uses the current system and generates more revenue form it.

Private funding of highway projects, including toll roads and bonds, promotes a quicker start to construction on new projects. Privately-owned toll roads can procure capital funding more quickly than traditional methods. Quicker access to funding means a quicker start to construction. Bonds generate a large amount of revenue up-front for projects so that construction can begin before it otherwise could. Both methods are excellent in initiating construction more rapidly.

All of the methods discussed make funding possible for major transportation investments that might not otherwise receive funding. Each innovative solution will provide additional funds for the highway system above those currently being collected.

Table 5-1. Alabama funding solutions as innovative finance options

Innovative Financing Solution	Maximize the ability to leverage federal funds	Utilize existing funds more effectively	Begin construction on projects more quickly	Make funding possible for major transportation investments
Vehicle Mileage Road User Fee (VMRUF)				✓
Heavy Truck Road User Fee (HTRUF)				✓
Publicly-owned Toll Roads	✓	✓		✓
Private Funding of Toll Roads	✓		✓	✓
Private Funding with Bonds	✓		✓	✓
Road User Congestion Charge	✓			✓
Inspection fees				✓
Increase Fuels Tax		✓		✓

Table 5-2 categorizes the anticipated revenue from each innovative finance option. Some options, such as toll roads and private funding are not included because of their high variability in revenue generation. It is seen that any of the options can be projected to produce more revenue for Alabama's highways than the current fuel tax. Some options can be implemented simultaneously, such as increasing fuel taxes, implementing the HTRUF, and beginning inspection fees. However, some of the solutions must replace current sources, such as the VMRUF replacing the gas tax. It is important to note that the anticipated revenues in Table 5-2 are gross revenues and do not account for capital or operating costs. Therefore, it is recommended that a more thorough cost-benefit analysis be performed to better determine the best course of action. For example, the capital costs of the VMRUF and HTRUF options are expected to be quite high relative to increasing the fuel tax.

5.3 Alabama Criteria for Determining a Good Revenue Solution

A good transportation revenue system should attempt to provide an equitable solution. This requires a correspondence between the costs to use the system and the amount of roadway use by the user. The road user fee would be an equitable financing solution in that there is a direct link between the amount being taxed and the individual's use of the roadways. In the past, fuel and gasoline taxes have been equitable options. However, as the use of more fuel efficient vehicles increases, this tax becomes less equitable, in that the fuel efficient vehicles are paying less money per mile of use under a fuel taxation system.

Table 5-2. Anticipated revenue from innovative finance options

Innovative Financing Solution	Anticipated Revenue
Current Fuel Tax (Gasoline and Diesel)[a]	$ 600,712,119
Increased Fuel Taxes[b]	$ 897,276,599
Vehicle Mileage Road User Fee (VMRUF)[c]	$ 921,873,169
Heavy Truck Road User Fee (HTRUF)[d]	$ 643,100,000
Inspection Fees	$ 45,433,610

Note: All amounts are gross revenues and do not account for capital or operating costs.
[a] – Based on current Alabama gas and diesel taxes of $0.18 and $0.19 per gallon, respectively; Alabama gasoline and motor fuels sold in fiscal year 2003 – 2004 used for calculation[58]
[b] – Current taxes indexed for inflation ($0.27 per gallon gasoline and $0.28 per gallon diesel)
[c] – Based on 2004 VMT[1] and vehicle registration data;[18] Based on 2004 vehicle percentages and road user fee of $0.015 per mile ($810,072,420); Includes fuel tax revenue for buses, motorcycles, and large trucks which is based on the difference between the calculated and actual motor fuels revenue for 2004[31] ($600,596,000 - $488,795,251 = 111,800,749);
[d] – Based on a road user fee of $0.25 per mile

A system of revenue should also be easily understood and evident to the users. For example, a user that pays a toll to use a road can clearly see these dollars being used to maintain that roadway.

A successful revenue system should also provide an adequate and reliable source of income for the present and the future. Not only should the revenue meet present funding needs, but also the increased future needs as population and road use grows. Although fuel taxes are presently a viable option, this system can become inefficient for funding as the fuel efficiency of vehicles improves in the future.

Diversity of revenue sources is also important. By selecting revenue sources that tap a variety of resources, the system is better able to sustain and recover in times of a slow economy. Presently, the majority of Alabama's funding is derived from gasoline and motor fuels taxes. More diversity will help to maintain a system that will not fail to meet the needs under various circumstances.

Table 5-3 summarizes each innovative financing solution discussed and determines its acceptability as a good solution for Alabama. As noted in the table, almost all of the solutions meet all the criteria for being a good revenue source for Alabama's highways. However, increasing fuels taxes fails to meet the "adequate and reliable source of income for the present and future" criteria. Due to the increased use of more fuel-efficient vehicles, the fuels tax is a declining revenue source.

By combining several of the funding options, the diversity criterion is met. Any combination of the proposed solutions would meet the requirements of diversity in the financing sources and would provide added flexibility for revenue adjustments based on needs and priorities.

Table 5-3. Summary of innovative financing solutions and Alabama criteria for use

Innovative Financing Solution	Equitable solution	Option easily understood by the users	Provides an adequate and reliable source of income for the present and future
Vehicle Mileage Road User Fee (VMRUF)	Yes. Drivers who use the roads pay for the roads.	Yes, with some public awareness efforts.	Yes. Vehicles will always accumulate mileage on the roadways.
Heavy Truck Road User Fee (HTRUF)	Yes. Trucks cause the most damage to the roadways and should pay more.	Yes, with some educational efforts.	Yes, as long as there is commerce traveling through the state.
Publicly-owned Toll Roads	Yes. Motorists are paying directly for the use of the road.	Yes	Yes
Private Funding of Toll Roads	Yes. Motorists are paying directly for the use of the road.	Yes	Yes
Private Funding with Bonds	Yes	Yes	Yes and No. No, in that the funds must be found to repay the bonds.
Road User Congestion Charge	Yes. Motorists who wish to use the roads at peak times pay peak prices.	Yes	Yes
Inspection fees	Yes. All Alabamians deserve safe roads and a healthy environment.	Yes	Yes
Increase Fuels Tax	Yes, but less equitable than the VMRUF.	Yes	No

6.0 Conclusions And Recommendations

6.1 Plans for the Immediate Future

This review of available options indicates that for the immediate future, the most desirable, efficient, and effective solution to funding Alabama's highways is to increase the fuel tax. Raising the gas tax to at least $0.27 per gallon is recommended to provide a substantial amount of revenue. However, as the gasoline tax revenue declines, additional options should be considered and future plans made to implement alternative financing solutions to complement or replace the fuel tax revenue.

Inspection fees, although requiring some additional start-up capital cost and time, have great potential benefit when implemented in the not-to-distant future. This revenue system is a positive source of income for the highway system, and it is also a positive move for protecting Alabama's environment from air pollution. In an age where gases are depleting the ozone and global warming is leading to increased storms and hurricanes, the environmental considerations are more important than ever. Increased safety is also an important benefit of vehicle inspections. It is recommended that a $15 inspection fee is imposed, $10 of which would go to ALDOT and the remaining $5 to the service station performing the inspection. Motorists requiring both a safety inspection and emissions inspection should still be charged only one $15 fee. Also, any vehicle failing an inspection that returns to the same station for retesting within 30 days would only be charged the $5 portion of the fee that goes to the station. Although implementing inspection fees creates an additional bureaucracy in the state, the benefits to highway funding, safety, and the environment outweigh this concern.

Toll collection is also a viable option that can be used on more of Alabama's new roadways and bridges. The main argument for toll roads is fairness. Those motorists who are using the roadway are funding it, and those who do not use the road are not contributing. Also, the drivers who use the road the most are paying the most for its upkeep. Tolls also promise to be a more reliable revenue stream than the fuel tax. All new large highway construction projects in Alabama should be studied for the feasibility of toll revenue. This is an excellent way to finance the capital costs of roadways and bridges, and to pay for the maintenance of the facilities. If bonds are used to provide more immediate funds for the capital costs, the toll revenues can be used to repay the bonds. As an added advantage, the toll revenues will act as a credit to Alabama's matching portion of federal funds.

Utilizing private funding for toll roads could also be part of the immediate plans for Alabama's highway funding. Private funding should be used and encouraged for ALDOT projects. Privatization results in faster construction, more efficient management, lower operating costs,

and increased revenues. It is recommended that private ownership is followed by a transfer to the state after an agreed upon amount of time.

An analysis is recommended for the allocation of money generated from vehicle registration fees and title fees. The allocation of registration fees greatly diverts money that should be available for the highway fund. Additionally, vehicle title fees are directly related to Alabama's roadways, but none of the collected funds are allocated for the highway fund. One of the reasons Alabamians are hesitant to vote on an increased tax is because they are not currently satisfied with the way funds are being spent. Therefore, reevaluation of funding allocations, public meetings, and open forums can increase trust and public support for any type of alternative funding option finally adopted.

A comprehensive public campaign is also recommended. Alabama citizens should be made aware of the state's need for highway funding and each driver's responsibility to contribute to the construction and maintenance of roadways. Alabamians need to be shown the benefit of increased funding as it impacts them directly. This public campaign should reach all of Alabama's drivers and must be completed regardless of which option is chosen for funding in the state. Educating the public is perhaps the most important first step in any innovative financing option.

6.2 Studies for Future Considerations

6.2.1 Vehicle mileage road user fee future studies

As stated earlier, the VMRUF can revolutionize the way highway revenues are collected in the state. Alabama could also be on the leading edge of new technologies and introduce a fresh perspective on the collection of highway fees. By investing in this new system and technology now, Alabama can create a system that is well-suited and custom made for use in the state for both the near- and long term future.

Adopting a road user fee prepares the highway revenue system for the future when a large number of Alabamians are driving fuel efficient vehicles and gasoline tax revenue is no longer adequate to fund the transportation system. In order to more thoroughly test and study the feasibility of this system, an actual test program should be conducted in a future study. Technology design should be a top priority to the eventual implementation of this system. Standards in the technology design should also be addressed so the same OBUs can be used in states other than Alabama. Then, a pilot program should be run to obtain realistic data and expectations from the system. Additionally, public discussions and opinions should be gathered to determine the extent to which privacy matters are a concern to Alabama citizens in this venue.

It is recommended that an additional study of the user fee rate be performed. Instead of charging a flat rate for all vehicles, the rate can be adjusted for each vehicle according to the weight or fuel efficiency of the vehicle. Adjusting the rate in this manner would provide a method of

promoting the use of more fuel-efficient vehicles, which benefits the state and the country both environmentally and economically.

These steps should be taken soon, because implementation of a system such as this will take a substantial amount of time. Moreover, any substantial change to the current system will likely cause public opposition; therefore, an intense public awareness campaign would be required to accompany an implementation of this type of system. Despite some difficulties in widespread implementation, this option should be given great attention by government officials, financial analysts and the public, because it has the best potential for the future of Alabama's highway revenue system.

6.2.2 Heavy truck road user fee future studies

The HTRUF should also be studied in more depth. This innovative revenue source is an excellent way to generate income that is both equitable and sustainable. Study and design of the technologies and software should begin in the near future, and a pilot program should be implemented to demonstrate benefits and identify needs for future development. In the meantime, a method of collecting the fees manually, using the detailed records already kept by fleet owners, could give a better indication of the revenue-generating potential of the HTRUF.

By making the design and implementation of the HTRUF a top priority, Alabama could lead the way in the U.S. for such an innovative source for highway funding. Europe is setting an example for this type of fee with positive outcomes as different versions of truck mileage fees continue to spread quickly throughout Europe.

Additionally, truck use in general should be further evaluated in the state. A more thorough understanding of the types of trucks and the goods they are transporting should be determined. In doing so, further study can be performed in truck user fees, such as billing certain industries more than others based on the damage the trucks have on the roadways.

6.2.3 Cost- benefit analysis

A through cost-benefit analysis should be performed on all the innovative financing options discussed in this study to more accurately determine the best choices for Alabama. Since much of the costs will be determined based on new technology designs and issues for future study, an accurate overview of the capital and operating costs are not available at this time. However, it would be beneficial to complete a detailed analysis when these resources become available.

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APPENDIX A:

Table A-1: List of State department of transportation websites

State	Department of Transportation Website
Alabama	http://www.dot.state.al.us/
Alaska	http://www.dot.state.ak.us/
Arizona	http://www.dot.state.az.us/
Arkansas	http://www.ArkansasHighways.com
California	http://www.dot.ca.gov/
Colorado	http://www.dot.state.co.us/
Connecticut	http://www.dot.state.ct.us/
Delaware	http://www.deldot.net/
District of Columbia	http://www.ddot.dc.gov/main.shtm
Florida	http://www.dot.state.fl.us/
Georgia	http://www.dot.state.ga.us/
Hawaii	http://www.hawaii.gov/dot/
Idaho	http://itd.idaho.gov
Illinois	http://www.dot.state.il.us/
Indiana	http://www.ai.org/dot/
Iowa	http://www.state.ia.us/government/dot/
Kansas	http://www.ink.org/public/kdot/
Kentucky	http://www.kytc.state.ky.us/
Louisiana	http://www.dotd.state.la.us/
Maine	http://www.state.me.us/mdot/homepage.htm
Maryland	http://www.mdot.state.md.us/
Massachusetts	http://www.magnet.state.ma.us/mhd/home.htm
Michigan	http://www.mdot.state.mi.us/
Minnesota	http://www.dot.state.mn.us/
Mississippi	http://www.mdot.state.ms.us/
Missouri	http://www.modot.state.mo.us/
Montana	http://www.mdt.state.mt.us/
Nebraska	http://www.dor.state.ne.us/
Nevada	http://www.nevadadot.com/
New Hampshire	http://www.state.nh.us/dot/
New Jersey	http://www.state.nj.us/transportation
New Mexico	http://www.nmshtd.state.nm.us/
New York	http://www.dot.state.ny.us/
North Carolina	http://www.ncdot.org/
North Dakota	http://www.state.nd.us/dot/
Ohio	http://www.dot.state.oh.us/
Oklahoma	http://www.okladot.state.ok.us/
Oregon	http://www.odot.state.or.us/
Pennsylvania	http://www.dot.state.pa.us/
Rhode Island	http://www.dot.state.ri.us/

Table A-1: List of State department of transportation websites (continued)

State	Department of Transportation Website
South Carolina	http://www.dot.state.sc.us/
South Dakota	http://www.sddot.com/
Tennessee	http://www.tdot.state.tn.us/
Texas	http://www.dot.state.tx.us/
Utah	http://www.dot.state.ut.us/
Vermont	http://www.aot.state.vt.us/
Virginia	http://virginiadot.org/
Washington	http://www.wsdot.wa.gov/
West Virginia	http://www.wvdot.com/

APPENDIX B:

Table B-1: List of state department of revenue websites

State	Department of Revenue or Finance Website
Alabama	http://www.ador.state.al.us/
Alaska	http://www.revenue.state.ak.us/
Arizona	http://www.revenue.state.az.us/
Arkansas	http://www.state.ar.us/dfa/
California	http://www.dof.ca.gov/default.asp
Colorado	http://www.revenue.state.co.us/main/home.asp
Connecticut	http://www.ct.gov/drs/site/default.asp
Delaware	http://www.state.de.us/revenue/default.shtml
District of Columbia	http://cfo.dc.gov/otr/site/default.asp
Florida	http://sun6.dms.state.fl.us/dor/
Georgia	http://www.etax.dor.ga.gov/
Hawaii	http://www.state.hi.us/tax/tax.html
Idaho	http://tax.idaho.gov/index.html
Illinois	http://www.revenue.state.il.us/
Indiana	http://www.in.gov/dor/
Iowa	http://www.state.ia.us/tax/index.html
Kansas	http://www.ksrevenue.org/
Kentucky	http://revenue.ky.gov/
Louisiana	http://www.rev.state.la.us/
Maine	http://www.state.me.us/revenue/
Maryland	http://www.state.me.us/revenue/
Massachusetts	http://www.dor.state.ma.us/
Michigan	http://www.michigan.gov/treasury
Minnesota	http://www.taxes.state.mn.us/
Mississippi	http://www.mstc.state.ms.us/
Missouri	http://www.dor.mo.gov/index.htm
Montana	http://mt.gov/revenue/default.asp
Nebraska	http://www.revenue.state.ne.us/index.html
Nevada	http://tax.state.nv.us/
New Hampshire	http://www.state.nh.us/revenue/index.htm
New Jersey	http://www.state.nj.us/treasury/taxation/
New Mexico	http://www.state.nm.us/tax/
New York	http://www.tax.state.ny.us/
North Carolina	http://www.dor.state.nc.us/
North Dakota	http://www.nd.gov/tax/
Ohio	http://tax.ohio.gov/
Oklahoma	http://www.oktax.state.ok.us/
Oregon	http://www.oregon.gov/DOR/
Pennsylvania	http://www.revenue.state.pa.us/revenue/site/default.asp
Rhode Island	http://www.tax.ri.gov/

Table B-1: List of state department of revenue websites (continued)

State	Department of Revenue or Finance Website
South Carolina	http://www.sctax.org/default.htm
South Dakota	http://www.state.sd.us/drr2/Revenue.html
Tennessee	http://www.state.tn.us/revenue/
Texas	http://www.window.state.tx.us/m23taxes.html
Utah	http://tax.utah.gov/
Vermont	http://www.state.vt.us/tax/
Virginia	http://www.tax.virginia.gov/
Washington	http://dor.wa.gov/
West Virginia	http://www.wvrevenue.gov/
Wisconsin	http://www.dor.state.wi.us/
Wyoming	http://revenue.state.wy.us/

APPENDIX C
Detailed Calculations for Vehicle Mileage Road User Fee

Table C-1: Calculations of average MPG and gas taxes for different vehicle types

Vehicle Type	Vehicle Description	Average MPG[a]	Annual 2004 gas tax revenue[b]
CNG	2005 Chevrolet K2500 HD Silverado 4WD	10.5	$75.00
CNG	2005 Honda Civic	32	$75.00
Average CNG & LPG[c]		**21.25**	**$75.00**
Ethanol	2005 Mercury Sable	17.5	$19.94
Ethanol	2005 Ford Explorer 4WD	13	$26.85
Average Ethanol[d]		**15.25**	**$23.39**
Hybrid Car	2005 Toyota Prius	55.5	$41.92
Hybrid Car	2005 Honda Civic	47.5	$48.98
Hybrid Car	2005 Honda Insight	56.5	$41.18
Hybrid Truck	2005 Chevrolet Silverado Hybrid	19.5	$119.32
Hybrid Truck	2005 GMC Sierra Hybrid	19.5	$119.32
Hybrid SUV	2005 Ford Escape HEV	31.0	$75.05
Average Hybrid		**38.3**	**$74.30**
2-Dr Coupe	2005 Toyota Camry Solara	25.0	$93.07
2-Dr Coupe	2005 Honda Civic	32.0	$72.71
2-Dr Coupe	2005 Ford Focus	29.0	$80.23
Sports Car	2005 Lexus IS 300	21.5	$108.22
Sports Car	2005Honda S2000	22.5	$103.41
Sports Car	2005 BMW Z4-Series	24.0	$96.95
4-Dr Sedan	2005 Acura TL	24.5	$94.97
4-Dr Sedan	2005 Lexus ES330	25.0	$93.07
4-Dr Sedan	2005 Cadillac CTS	22.0	$105.76
Average Automobile		**25.1**	**$94.26**
Van	2005 Honda Odyssey	24.0	$96.95
Van	2005 Toyota Sienna	22.5	$103.41
Van	2005 Dodge Caravan	21.5	$108.22
Average Van		**22.7**	**$102.86**
Truck	2005 Dodge Dakota	19.0	$122.46
Truck	2005 Chevrolet Silverado	12.5	$186.13
Truck	2005 Dodge Dakota	19.0	$122.46
Average Truck		**16.8**	**$143.68**
SUV	2005 Lexus RX330	22.0	$105.76
SUV	2005 Honda CR-V	26.0	$89.49
SUV	2005 Honda Pilot	19.5	$119.32
Average SUV		**22.5**	**$104.85**

[a] – MPG (miles per gallon)
[b] – Gas tax revenue is based on Alabama's $0.18 per gallon tax and an annual vehicle-miles-traveled per capita of 12,926 (United States Federal Highway Administration 1995 – 2004)
[c] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[d] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline
Note – MPG data taken from the U.S. Department of Energy's Fuel Economy Guide (United States Department of Energy 2005)

Table C-2: Projected vehicle registrations and vehicle miles traveled per capita in Alabama

Year	Adjusted Registered Vehicles[a]	VMT/capita[b]
2003	4,178,000	
2004	4,345,120	12926
2005	4,518,925	13055
2006	4,699,682	13186
2007	4,887,669	13318
2008	5,083,176	13451
2009	5,286,503	13585
2010	5,497,963	13721
2011	5,717,881	13858
2012	5,946,597	13997
2013	6,184,461	14137
2014	6,431,839	14278
2015	6,689,113	14421
2016	6,956,677	14565
2017	7,234,944	14711
2018	7,524,342	14858
2019	7,825,316	15007
2020	8,138,328	15157

[a] – 2003 data is registered vehicles excluding buses, heavy trucks, and motorcycles (United States Department of Transportation); assumes a 4% average annual increase
[b] – 2004 data from Highway Statistics (United States Federal Highway Administration 1995 – 2004); assumes a 1% annual increase

C-3: Determination of vehicle sample sets for VMRUF

2003	Actual percentage	Actual Registered Vehicles[3]	Adjusted percentage	Adjusted Registered Vehicles[a]
LPG & CNG[b]	0		0.14	6025
Ethanol[c]	0		0.07	2903
Electricity	0		0.02	681
Hybrids	0		0.03	1,151
Automobiles	42.01	1,755,000	41.90	1,750,480
Vans	8.52	356,000	8.50	355,083
Trucks	43.56	1,820,000	43.45	1,815,313
SUV	5.91	247,000	5.90	246,364
Total	100	4,178,000	100.00	4,178,000
2010			**%**	**Vehicles**
LPG & CNG[b]			0.37	20,615
Ethanol[c]			0.18	9,934
Electricity			0.04	2,329
Hybrids			5.00	274,898
Automobiles			39.65	2,180,177
Vans			8.04	442,247
Trucks			41.12	2,260,924
SUV			5.58	306,840
Total			100.00	5,497,963
2020			**%**	**Vehicles**
LPG & CNG[b]			0.61	49,294
Ethanol[c]			0.29	23,754
Electricity			0.07	5,569
Hybrids			15.00	1,220,749
Automobiles			35.30	2,872,757
Vans			7.16	582,736
Trucks			36.61	2,979,156
SUV			4.97	404,314
Total			100.00	8,138,328

[a] – Will be used a sample set in calculations
[b] – LPG (liquefied petroleum gas); CNG (compressed natural gas)
[c] – 85% ethanol and 15% gasoline

Table C-4: 2004 gas tax revenues at $0.27 per gallon and $0.30 per gallon by vehicle type

Vehicle Type	Vehicle Description	Average MPG[a]	2004 gas tax revenue adjusted for inflation[b] ($0.27 per gallon)	2004 gas tax revenue at ($0.30 per gallon)
CNG[c]	2005 Chevrolet K2500 HD Silverado 4WD	10.5	$75.00	$75.00
CNG[c]	2005 Honda Civic	32	$75.00	$75.00
Average CNG & LPG[c]		**21.25**	**$75.00**	**$75.00**
Ethanol[d]	2005 Mercury Sable	17.5	$29.91	$33.24
Ethanol[d]	2005 Ford Explorer 4WD	13	$40.27	$44.74
Average Ethanol[d]		**15.25**	**$34.33**	**$38.14**
Hybrid Car	2005 Toyota Prius	55.5	$62.88	$69.87
Hybrid Car	2005 Honda Civic	47.5	$73.47	$81.64
Hybrid Car	2005 Honda Insight	56.5	$61.77	$68.63
Hybrid Truck	2005 Chevrolet Silverado Hybrid	19.5	$178.98	$198.86
Hybrid Truck	2005 GMC Sierra Hybrid	19.5	$178.98	$198.86
Hybrid SUV	2005 Ford Escape HEV	31.0	$112.58	$125.09
Average Hybrid		**38.3**	**$111.44**	**$123.83**
2-Dr Coupe	2005 Toyota Camry Solara	25.0	$139.60	$155.11
2-Dr Coupe	2005 Honda Civic	32.0	$109.06	$121.18
2-Dr Coupe	2005 Ford Focus	29.0	$120.35	$133.72
Sports Car	2005 Lexus IS 300	21.5	$162.33	$180.36
Sports Car	2005Honda S2000	22.5	$155.11	$172.35
Sports Car	2005 BMW Z4-Series	24.0	$145.42	$161.58
4-Dr Sedan	2005 Acura TL	24.5	$142.45	$158.28
4-Dr Sedan	2005 Lexus ES330	25.0	$139.60	$155.11
4-Dr Sedan	2005 Cadillac CTS	22.0	$158.64	$176.26
Average Automobile		**25.1**	**$141.39**	**$157.11**
Van	2005 Honda Odyssey	24.0	$145.42	$161.58
Van	2005 Toyota Sienna	22.5	$155.11	$172.35
Van	2005 Dodge Caravan	21.5	$162.33	$180.36
Average Van		**22.7**	**$154.29**	**$171.43**
Truck	2005 Dodge Dakota	19.0	$183.69	$204.09
Truck	2005 Chevrolet Silverado	12.5	$279.20	$310.22
Truck	2005 Dodge Dakota	19.0	$183.69	$204.09
Average Truck		**16.8**	**$215.52**	**$239.47**
SUV	2005 Lexus RX330	22.0	$158.64	$176.26
SUV	2005 Honda CR-V	26.0	$134.23	$149.15
SUV	2005 Honda Pilot	19.5	$178.98	$198.86
Average SUV		**22.5**	**$157.28**	**$174.76**

[a] – MPG (miles per gallon)
[b] – Gas tax revenue is $0.27 per gallon tax adjusted for inflation and an annual vehicle-miles-traveled per capita of 12,926 (United States Federal Highway Administration 1995 – 2004)
[c] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[d] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline
Note – MPG data taken from the U.S. Department of Energy's Fuel Economy Guide (United States Department of Energy 2005)

Table C-5: 2010 gas tax revenues at $0.27 per gallon and $0.30 per gallon by vehicle type

Vehicle Type	Vehicle Description	Average MPG[a]	2010 gas tax revenue adjusted for inflation[b] ($0.27 per gallon)	2010 gas tax revenue at ($0.30 per gallon)
CNG[c]	2005 Chevrolet K2500 HD Silverado 4WD	10.5	$75.00	$75.00
CNG[c]	2005 Honda Civic	32	$75.00	$75.00
Average CNG & LPG[c]		**21.25**	**$75.00**	**$75.00**
Ethanol[d]	2005 Mercury Sable	17.5	$31.75	$35.28
Ethanol[d]	2005 Ford Explorer 4WD	13	$42.75	$47.50
Average Ethanol[d]		**15.25**	**$36.44**	**$40.49**
Hybrid Car	2005 Toyota Prius	55.5	$66.75	$74.17
Hybrid Car	2005 Honda Civic	47.5	$77.99	$86.66
Hybrid Car	2005 Honda Insight	56.5	$65.57	$72.86
Hybrid Truck	2005 Chevrolet Silverado Hybrid	19.5	$189.99	$211.10
Hybrid Truck	2005 GMC Sierra Hybrid	19.5	$189.99	$211.10
Hybrid SUV	2005 Ford Escape HEV	31.0	$119.51	$132.79
Average Hybrid		**38.3**	**$118.30**	**$131.44**
2-Dr Coupe	2005 Toyota Camry Solara	25.0	$148.19	$164.65
2-Dr Coupe	2005 Honda Civic	32.0	$115.77	$128.64
2-Dr Coupe	2005 Ford Focus	29.0	$127.75	$141.94
Sports Car	2005 Lexus IS 300	21.5	$172.31	$191.46
Sports Car	2005Honda S2000	22.5	$164.65	$182.95
Sports Car	2005 BMW Z4-Series	24.0	$154.36	$171.52
4-Dr Sedan	2005 Acura TL	24.5	$151.21	$168.01
4-Dr Sedan	2005 Lexus ES330	25.0	$148.19	$164.65
4-Dr Sedan	2005 Cadillac CTS	22.0	$168.40	$187.11
Average Automobile		**25.1**	**$150.09**	**$166.77**
Van	2005 Honda Odyssey	24.0	$154.36	$171.52
Van	2005 Toyota Sienna	22.5	$164.65	$182.95
Van	2005 Dodge Caravan	21.5	$172.31	$191.46
Average Van		**22.7**	**$163.78**	**$181.97**
Truck	2005 Dodge Dakota	19.0	$194.99	$216.65
Truck	2005 Chevrolet Silverado	12.5	$296.38	$329.31
Truck	2005 Dodge Dakota	19.0	$194.99	$216.65
Average Truck		**16.8**	**$228.78**	**$254.20**
SUV	2005 Lexus RX330	22.0	$168.40	$187.11
SUV	2005 Honda CR-V	26.0	$142.49	$158.32
SUV	2005 Honda Pilot	19.5	$189.99	$211.10
Average SUV		**22.5**	**$166.96**	**$185.51**

[a] – MPG (miles per gallon)
[b] – Gas tax revenue is $0.27 per gallon tax adjusted for inflation and an annual vehicle-miles-traveled per capita of 13,721
[c] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[d] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline
Note – MPG data taken from the U.S. Department of Energy's Fuel Economy Guide (United States Department of Energy 2005)

Table C-6: 2020 gas tax revenues at $0.27 per gallon and $0.30 per gallon by vehicle type

Vehicle Type	Vehicle Description	Average MPG[a]	2020 gas tax revenue adjusted for inflation[b] ($0.27 per gallon)	2020 gas tax revenue at ($0.30 per gallon)
CNG[c]	2005 Chevrolet K2500 HD Silverado 4WD	10.5	$75.00	$75.00
CNG[c]	2005 Honda Civic	32	$75.00	$75.00
Average CNG & LPG[c]		**21.25**	**$75.00**	**$75.00**
Ethanol[d]	2005 Mercury Sable	17.5	$35.08	$38.97
Ethanold	2005 Ford Explorer 4WD	13	$47.22	$52.47
Average Ethanol[d]		**15.25**	**$40.25**	**$44.72**
Hybrid Car	2005 Toyota Prius	55.5	$73.74	$81.93
Hybrid Car	2005 Honda Civic	47.5	$86.15	$95.73
Hybrid Car	2005 Honda Insight	56.5	$72.43	$80.48
Hybrid Truck	2005 Chevrolet Silverado Hybrid	19.5	$209.86	$233.18
Hybrid Truck	2005 GMC Sierra Hybrid	19.5	$209.86	$233.18
Hybrid SUV	2005 Ford Escape HEV	31.0	$132.01	$146.68
Average Hybrid		**38.3**	**$130.68**	**$145.20**
2-Dr Coupe	2005 Toyota Camry Solara	25.0	$163.69	$181.88
2-Dr Coupe	2005 Honda Civic	32.0	$127.89	$142.09
2-Dr Coupe	2005 Ford Focus	29.0	$141.11	$156.79
Sports Car	2005 Lexus IS 300	21.5	$190.34	$211.49
Sports Car	2005Honda S2000	22.5	$181.88	$202.09
Sports Car	2005 BMW Z4-Series	24.0	$170.51	$189.46
4-Dr Sedan	2005 Acura TL	24.5	$167.03	$185.59
4-Dr Sedan	2005 Lexus ES330	25.0	$163.69	$181.88
4-Dr Sedan	2005 Cadillac CTS	22.0	$186.01	$206.68
Average Automobile		**25.1**	**$165.80**	**$184.22**
Van	2005 Honda Odyssey	24.0	$170.51	$189.46
Van	2005 Toyota Sienna	22.5	$181.88	$202.09
Van	2005 Dodge Caravan	21.5	$190.34	$211.49
Average Van		**22.7**	**$180.91**	**$201.01**
Truck	2005 Dodge Dakota	19.0	$215.39	$239.32
Truck	2005 Chevrolet Silverado	12.5	$327.39	$363.76
Truck	2005 Dodge Dakota	19.0	$215.39	$239.32
Average Truck		**16.8**	**$252.72**	**$280.80**
SUV	2005 Lexus RX330	22.0	$186.01	$206.68
SUV	2005 Honda CR-V	26.0	$157.40	$174.89
SUV	2005 Honda Pilot	19.5	$209.86	$233.18
Average SUV		**22.5**	**$184.42**	**$204.92**

[a] – MPG (miles per gallon)
[b] – Gas tax revenue is $0.27 per gallon tax adjusted for inflation and an annual vehicle-miles-traveled per capita of 15,157.
[c] – LPG (liquefied petroleum gas); CNG (compressed natural gas); Gas tax is an annual flat fee
[d] – 85% ethanol and 15% gasoline; Gas taxes based on 15% gasoline
Note – MPG data taken from the U.S. Department of Energy's Fuel Economy Guide[36]