

# **Revenue Enhancement Alternatives for The Alabama Department of Transportation**

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<b>16. Abstract</b> This report examines several potential revenue enhancement alternatives for ALDOT. To provide specific, useful information, it focuses on three areas:		<b>13. Type of Report and Period Covered</b> Final Report: 9/1/2011 – 7/31/2012
<ul style="list-style-type: none"> <li>• A survey of Alabama citizens to determine their attitude toward several revenue enhancement alternatives</li> <li>• An evaluation of which of the alternatives are capable of producing significant revenue increases</li> <li>• Because of specific interest within ALDOT, this study estimated potential revenues from levying tolls on Interstate highways in Alabama</li> </ul> <p>The telephone survey of 1011 Alabama citizens aged 19 years and older asked respondents which of eight alternative revenue sources they prefer if additional resources were needed to improve Alabama roads and bridges. Some of the most pertinent results are shown below:</p> <ul style="list-style-type: none"> <li>• Respondents are most strongly opposed to raising the gasoline tax (83.3% oppose or strongly oppose) and show low support for a road use fee (67.7% oppose or strongly oppose)</li> <li>• Respondents show high support for taxing citizens other than themselves; they would raise taxes on the small percentages of Alabama citizens who own hybrids and electric vehicles (29.4% support or strongly support)</li> <li>• Respondents showed highest support for taxing long Interstate trips (37.4% and 28.0% for 100-mile trips and 50-mile trips, respectively)</li> </ul> <p>Researchers examined seven options for increasing transportation funding revenue in Alabama. Indexing current revenue sources by both the Consumer Price Index and the Price Index of Construction Cost showed that those options generate little revenue in the short and mid-term. A tax on hybrid and electric vehicles would also raise little revenue in the short term. Revenue estimates for four other options show higher potential for significant revenue:</p> <ul style="list-style-type: none"> <li>• Implementation of Sales Tax on Gasoline and Diesel Fuel Purchases. A 4% sales tax on</li> </ul>		<b>14. Sponsoring Agency Code</b>

these purchases could increase revenue by over \$380 million/year.

- Increase in Excise Tax on Gasoline and Diesel Fuel. Each penny/gallon increase on gasoline raises approximately \$26 million/year.
- Tax on Hybrid and Electric Vehicles. A 1% addition to the current 2% tax would raise approximately \$1.7 million/year.
- General Vehicle Sales Tax Increase. Each percent-point increase above the current 2% tax rate would generate approximately \$89 million/year.
- Application of a Road Use Tax. A road use tax of one cent per mile for driving on Alabama roads and highways would generate \$68 million/year.

Researchers ran two different models to estimate potential revenue from an eighth alternative: tolling Interstate highways in Alabama. Results from both models indicate that revenues of at least \$240 million/year could be generated from implementing Interstate highway tolls. Results from the two models' "Most likely" scenarios generated values of \$249 million/year and \$390 million/year.

The estimates generated for this study are for a mature toll system. Implementing a toll system requires many one-time expenditures that may cost millions of dollars each, such as an investment-grade traffic-and-revenue study and software and equipment purchases for the Customer Service Center. Additionally, toll road use is depressed in the first years of operation while drivers become aware and accustomed to the toll and decide whether or not it is a good value. Estimates produced for this study do not include these one-time purchases, nor do they account for initial lower facility use after a toll has been implemented.

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# Contents

Executive Summary .....	vi
1.0 Introduction.....	1
2.0 Background.....	2
Tolling.....	2
Tolling Schemes.....	2
Collection Options .....	3
Legislation.....	8
Pricing.....	10
Customer Service Centers.....	12
Tolling Interoperability.....	13
Project Financing .....	15
Potential Drawbacks .....	16
3.0 Alternative Revenue Sources.....	19
Introduction.....	19
Current Revenue Sources.....	19
Baseline Projections.....	23
Indexing Based on the Consumer Price Index (CPI).....	25
Indexing based on Price Index of Construction Cost (Land Transportation).....	27
Implementation of Sales Tax on Gasoline and Diesel Fuel Purchases.....	27
Increase in Excise Tax on Gasoline and Diesel Fuel.....	28
Tax on Hybrid and Electric Vehicles.....	32
General Vehicle Sales Tax Increase .....	32
Cutbacks in Fuel Tax Exemptions .....	32
Application of a Road Use Tax.....	34
Tolling Interstate Roadways .....	35
4.0 Public Survey.....	37
Performing the Survey .....	37
5.0 Estimating Toll Revenue.....	40
The Model Inputs.....	42
The Models .....	44
The Results.....	48
6.0 Conclusions.....	51
References.....	53

## Executive Summary

This report examines several potential revenue enhancement alternatives for ALDOT. To provide specific, useful information, it focuses on three areas:

- A survey of Alabama citizens to determine their attitude toward several revenue enhancement alternatives
- An evaluation of which of the alternatives are capable of producing significant revenue increases
- Because of specific interest within ALDOT, this study estimated potential revenues from levying tolls on Interstate highways in Alabama

The telephone survey of 1011 Alabama citizens aged 19 years and older asked respondents which of eight alternative revenue sources they prefer if additional resources were needed to improve Alabama roads and bridges. Some of the most pertinent results are shown below:

- Respondents are most strongly opposed to raising the gasoline tax (83.3% oppose or strongly oppose) and show low support for a road use fee (67.7% oppose or strongly oppose)
- Respondents show high support for taxing citizens other than themselves; they would raise taxes on the small percentages of Alabama citizens who own hybrids and electric vehicles (29.4% support or strongly support)
- Respondents showed highest support for taxing long Interstate trips (37.4% and 28.0% for 100-mile trips and 50-mile trips, respectively)

Researchers examined seven options for increasing transportation funding revenue in Alabama. Indexing current revenue sources by both the Consumer Price Index and the Price Index of Construction Cost showed that those options generate little revenue in the short and mid-term. A tax on hybrid and electric vehicles would also raise little revenue in the short term. Revenue estimates for four other options show higher potential for significant revenue:

- Implementation of Sales Tax on Gasoline and Diesel Fuel Purchases. A 4% sales tax on these purchases could increase revenue by over \$380 million/year.
- Increase in Excise Tax on Gasoline and Diesel Fuel. Each penny/gallon increase of the tax on gasoline raises approximately \$26 million/year
- General Vehicle Sales Tax Increase. Each percent increase above the current 2% tax rate would generate approximately \$89 million/year
- Application of a Road Use Tax. A road use tax of one cent per mile for driving on Alabama roads and highways would generate \$68 million/year.

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The estimates generated for this study are for a mature toll system. Implementing a toll system requires many one-time expenditures that may cost millions of dollars each, such as an investment-grade traffic-and-revenue study and software and equipment purchases for the Customer Service Center. Additionally, toll road use is depressed in the first years of operation while drivers become aware and accustomed to the toll and decide whether or not it is a good value. Estimates produced for this study do not include these one-time purchases, nor do they account for initial lower facility use after a toll has been implemented.

## **Chapter 1**

### **Introduction**

Surface transportation funding in Alabama and in the US is facing a defining moment regarding the methods it will use to fund transportation improvements. Due to the weakening economy, the ever improving fuel efficiency of vehicles, and other factors, the traditional funding sources for surface transportation, motor fuel taxes, are having difficulty generating sufficient revenue to meet highway construction and maintenance needs.

UTCA Project #11403, *Revenue Enhancement Alternatives for the Alabama Department of Transportation* (ALDOT), examines possible solutions to ALDOT's funding problems. To provide specific, useful information concerning the potential transportation funding crisis and potential practical alternatives in the state of Alabama, this project focused on three areas. First, the project surveyed Alabama citizens to determine their attitudes toward revenue enhancement alternatives. Second, it evaluated which of the alternatives are capable of replacing or supplementing the current funding sources. Third, because of specific interest within ALDOT, it projected potential revenues from levying tolls on Interstate highways in Alabama.

The objective of the research is to provide ALDOT decision makers with two types of information that they will find valuable when working to address an impending funding gap. The survey of Alabama citizens will provide insight into their willingness to accept specific types of highway revenue modifications. The data concerning specific revenue enhancement alternatives will inform decision makers as to which of those alternatives can generate sufficient revenue to address budget shortfalls.

## Chapter 2 Background

### Tolling

Placing tolls on existing roads offers a possible solution to ALDOT's revenue concerns. Tolling establishes a new source of revenue that can be used to build, operate, and maintain the road system. In addition to increased revenues, tolling offers other benefits. Tolling can ensure that users pay for the road that they use, it stabilizes transportation funding (World Bank), and it helps roads last longer. For these reasons more state and local governments are using tolling.

When implementing a toll road, agencies must make decisions about how prices are determined, how money is collected, and how the toll facility is built and maintained. These topics are described in this chapter.

### Tolling Schemes

*Tolling scheme* (sometimes called *tolling configuration*) refers to the placement of tolling points in the facility. There are two common tolling schemes in the US: the closed system and the open system. In closed systems, equipment or personnel monitor each vehicle's entry into and exit from the tolled facility. The ticket-based system is a common example: drivers receive a location-stamped ticket as they enter the facility that is used to calculate their toll as they exit the facility. However, entry and exit can be handled electronically using transponders, cameras, or GPS. Figure 2-1 provides an drawing of a closed system.

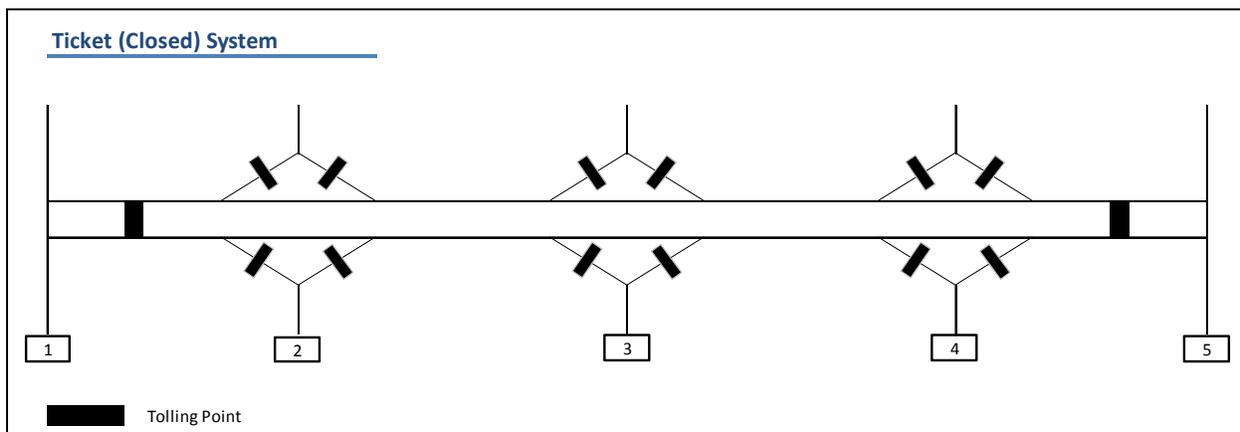


Figure 2-1. An example of a closed system (Dailer and Hevia-Moren 2011a)

In open systems (Figure 2-2), each vehicle's entry and exit is not tracked. Rather, vehicles are assessed a toll at each tolling point without regard for where they exit. Open systems use fewer

tolling places, so 1) they may be a viable option where the number of vehicles or toll is insufficient to maintain a closed system and 2) their tolls have a weaker relationship with distance traveled. Auditing open systems is also easier than auditing closed systems because the auditors do not need to match entries and exits (Dailer and Hevia-Moren 2011a).

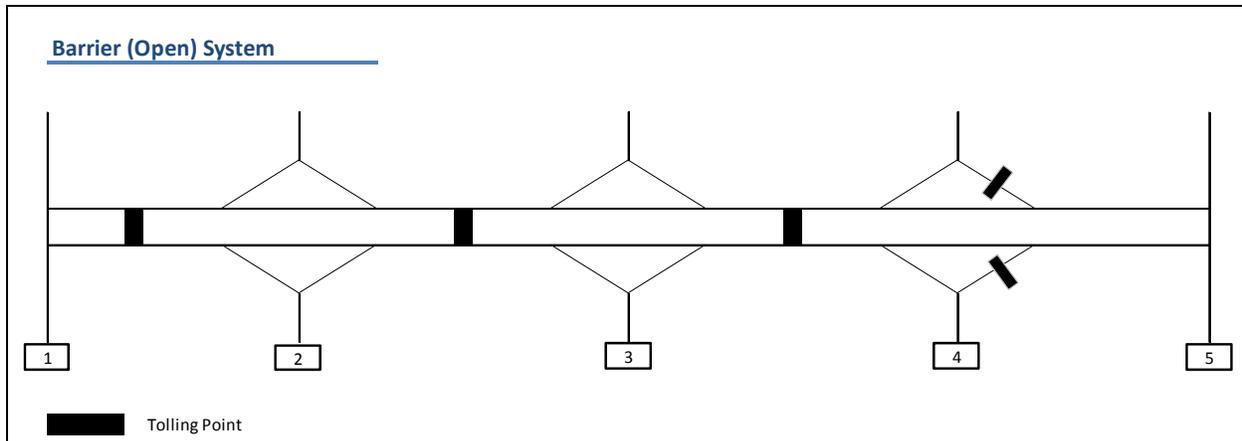


Figure 2-2. An open-system example (Dailer and Hevia-Moren 2011a)

### Collection Options

Collection options used to be limited to a human operator in a toll booth, but technology now offers automatic options. Toll-road operators have equipped booths with baskets to collect change (see Figure 2-3) and machines to read debit cards and credit cards. More advanced systems use transponders on vehicles' windshields, cameras that read license plates, or global positioning systems (GPS) to identify cars on the toll facility at highway speeds. The tolling authority then subtracts the toll from the operator's account or sends a bill to the driver. These more-advanced systems that do not stop or slow traffic are called open-road tolling systems.

Booths are costly. They require more personnel and machines that are expensive to purchase and maintain, and they cause safety and environmental problems. Given the high cost of booths, toll authorities are moving toward open-road tolling (Ramirez 2012, Samuel 2012). Many new toll facilities are open-road systems (e.g. the Triangle Expressway in North Carolina), and existing toll facilities are converting to open-road systems (e.g. Gratigny Parkway in Miami; see Chardy 2010). Although providing a cash option can help collection rates, at least in the first years of a new facility (Garrett 2012), offering a toll-booth option "is almost impossible to do now" (Samuel 2012).

This section describes these collection options in more detail.

**Traditional Toll Booths** Traditional toll booths are standing structures that house an employee who handles a cash transaction. Traditional toll booths were the most common way to collect tolls before technology existed to conduct transactions automatically.



Figure 2-3. An automatic coin booth

Traditional toll booths offer a high collection rate. With automatic systems and especially open-road systems, toll evasion can be high: some systems may only collect half the tolls they are owed by out-of-state vehicles. With traditional tolling systems, vehicles must pass the toll booth to continue on the road, so almost everyone pays.

Traditional toll booths (Figure 2-4) are costly to build and operate. They rely on employees to handle cash transactions, who are slower, more mistake prone, and more expensive than electronic methods, and they require significant investments in real estate, construction, and maintenance. Samuel (2012) estimates that an all-electronic toll point recently built in New York for \$8-\$10 million would have cost \$45-\$50 million if it included a cash option, and each transaction would cost five times as much to conduct. Because traditional toll booths are so costly, toll roads that use them may have fewer entrances or exits than is ideal and may require many vehicles to pass to break even, making them less suitable for low-traffic roads.



Figure 2-4. A traditional toll booth

Traditional toll booths also require vehicles to stop to pay the toll, which disrupts traffic, increases emissions, and makes traffic crashes more likely. Drivers prefer toll roads for their speed and convenience, but each tolling point slows traffic and inconveniences the driver, reducing the benefits that toll roads offer and making it more likely vehicles choose alternative routes. Moreover, to minimize vehicle delay, more booths than lanes are required at each tolling point, but more booths requires additional real estate, construction, and operation costs.

The high cost of traditional toll booths makes them impractical in many situations. However, new, open-road technology reduces the cost of building and operating toll points and of conducting transactions, thereby making tolling a feasible option where it never was before.

**Automatic Coin and Card Booths** Automatic coin and card booths are standing structures that have a basket for the driver to throw change in or a machine for the driver to swipe a debit card or credit card on. Although they require significant investment in real estate and construction, automatic coin booths are cheaper to operate than traditional toll booths because they do not require an employee. However, they require drivers to have exact change or pay more than the toll. Automatic card booths also avoid the cost of an employee, and they reduce transactions to a single swipe, but card transactions can be slow, and the toll authority has to pay a fee for each transaction.

Automatic coin and card booths slow or stop traffic, so they increase emissions and the probability of traffic crashes. Also, traffic can jam if the equipment malfunctions and there are no human operators around to fix it or override it.

**Open-Road Tolling** Open-road tolling systems enable the tolling authority to toll at highway speeds. In open-road tolling, vehicles do not stop to pay a toll; their movements are tracked electronically. In transponder and license-plate systems, each vehicle passes under gantries (Figure 2-5) that are equipped with transponder readers or cameras. If the vehicle has a transponder on its windshield, the tolling equipment automatically deducts the toll from the transponder's prepaid account. If the vehicle does not have a transponder, the tolling equipment takes a photograph of the vehicle's license plate, uses optical character recognition software to read the plate, identifies the vehicle's registered owner, and prepares a bill to be mailed to the owner.

In a GPS tolling system, each vehicle is equipped with a GPS device that tracks the vehicle's movement. GPS systems are only common in Germany (Dailer and Hevia-Moren 2011a). In a GPS system, an on-board device transmits location information to a central billing office. These systems are useful because they do not need gantries, so it is possible to toll virtually the entire road network, and because they can precisely toll based on the distance traveled. However, satellites are necessary, and the required communications network is extensive, so initial capital outlays are high; the GPS devices are expensive to purchase and install; privacy issues are a potential obstacle; and enforcement currently requires roadside and possibly mobile equipment to monitor for violators (Dailer and Hevia-Moren 2011a). This report does not discuss GPS systems further.

The equipment needed for open-road tolling depends on what the tolling authority wants to toll. At a minimum open-road tolling requires \$1-\$2 million to purchase a gantry (Patno 2012), install cameras and transponder detectors, and connect the gantry to a central office using fiber-optic cable. Costs vary with the difficulty of the installation and the number of cameras the tolling authority requires on the gantry. Video tolling passenger cars requires cameras pointed at the back of vehicles, but video tolling trucks requires cameras pointed at the front because trailers are constantly being moved from truck to truck. If the tolling authority wants to detect the vehicle type, it probably needs cameras pointing in both directions (Samuel 2012).

Open-road tolling also requires a “back office” (customer service center, CSC) to house equipment and process transactions. There may be one back office per state to which all gantries are connected. The office houses the central computing system as well as administrative and customer relations personnel. Estimates of the initial outlay for the back office vary wildly, from less than \$1 million (Patno 2012) up to \$10 million (Ramirez 2012). A usable value might be around \$2 million (Garrett 2012).

There are several advantages to systems based on transponders and license-plate cameras. First, they have lower capital outlays than booth systems. Booths require significant investments in real estate and infrastructure, while transponders and license-plate cameras use gantries, which have smaller footprints and lower construction costs.

Second, they reduce operations costs. Open-road systems do not need employees to staff toll booths.

Third, open-road tolling reduces road wear, travel times, crashes, and vehicle emissions. Cars must decelerate and accelerate around toll booths, which places a heavy burden on the pavement, increases emissions and the need for road maintenance, and increases the probability of crashes. Introducing transponder systems at toll points also increases gas mileage.

Last, open-road systems do not require many police resources. Enforcement typically comes by blocking vehicle registrations for non-payers, using interoperability agreements (see the Interoperability section later in this chapter) for out-of-state vehicles, and relying on third-party collection agencies.

Open-road tolling does pose challenges. It may be easier for someone to avoid paying in open-road tolling than in booth tolling. An electronic tolling system can capture a license plate for an out-of-state vehicle with no transponder and bill the vehicle’s registered owner, but without help from authorities in the vehicle’s local jurisdiction, it is difficult to compel the owner to pay. One system reported to the authors that it only collects about half of the tolls it is owed by out-of-state vehicle owners



**Figure 2-5. A gantry on an open-road tolling system**

Because it can be difficult to collect tolls using all-electronic systems from out-of-state sources, roads with higher proportions of out-of-state vehicles are less likely to be tolled even if they are otherwise suitable for tolling. State toll authorities are solving this problem by signing interoperability agreements in which each state attempts to collect the outstanding tolls owed to reciprocating states (see the Interoperability section later in this chapter).

Finally, there may be other political challenges to open-road tolling. Citizens may oppose paying to use a previously non-tolled road, and they may have privacy concerns about the large amounts of identifying information that electronic tolling collects (Ogden 2000), although these concerns can be ameliorated by offering ways to purchase transponders anonymously at gas stations or ATMs. Also, the tolling agency needs authorization from the legislature and governor to conduct business, which may introduce obstacles to implementation (see the Legislation section later in this chapter).

Reliability is not a problem for electronic tolling systems. The equipment identifies 99.99% of transponders and 99% of license plates on the Bicentennial Viaduct (Dailer and Hevia-Moren 2011a); 100% of transponders and 98% of license plates on the Autopista Central, Costanera Norte, and Vespucio Norte projects in Chile (Kapsch TrafficCom AB, 2005, cited in Dailer and Hevia-Moren 2011c); 96%-97% of transponders on I-15 in San Diego; and about 84% of transponders on I-15 in Salt Lake City (there is no video tolling at these last two locations; Dailer and Hevia-Moren 2011b).

**Combination** Open-road tolling systems are often combined with toll booths (Figure 2-6). This configuration gives users more payment options and offers another way for users to maintain the privacy of their data. However, booths are costly, even as a side option, so the trend is toward open-road tolling (Ramirez 2012, Samuel 2012).



Figure 2-6. A combination facility, which includes open-road tolling and booths

### *Legislation*

Tolling agencies need legal authority to conduct business. They may need to make contracts; sue and be sued; hire builders, contractors, and employees; rent, own, lease, and sell property; issue bonds; take loans; accept funds from governments at the local, state, and Federal levels; enter cooperative agreements with other toll agencies; bill users; and penalize noncompliance. Most states that toll roads use legislation to authorize an agency (or agencies) for tolling operations, and Alabama is no exception.

State legislatures typically create a new tolling agency or empower the department of transportation to operate the toll system. If the legislation creates a new agency, it usually stipulates characteristics of the agency's governing body, such as the number of members, the method of selecting members and assigning them to posts, and the length and number of terms members serve (Tennessee DOT 2006). Alabama is similar to other states in this respect. Alabama code § 23-2-143 creates the Alabama Toll Road, Bridge, and Tunnel Authority (ATRBTA) and appoints the governor, lieutenant governor, and speaker the House of Representatives or their designees, as well as the director of Transportation, director of Finance, the chair of the House Government Appropriations Committee, the chair of the Senate Finance and Taxation General Fund Committee, and two gubernatorial appointees to the Authority.

Liability is an important component of legislation, especially with open-road systems. In tolling systems that use automatic billing it is easy for the registered vehicle owner, who receives the bill, to claim someone else incurred the toll while driving the owner's vehicle. Most state legislatures that have authorized tolling have addressed the issue. Of the 17 statutes that the Alliance for Toll Interoperability (ATI) (2010) surveys, one holds the driver responsible; eight

hold the owner responsible; two hold the owner responsible unless she can show that someone else was driving when the toll was incurred; and five hold the owner, rentee, lessee, or operator responsible.<sup>1</sup> Alabama code § 23-2 does not address liability directly, but it does grant ATRBTA the authority to do what is necessary to collect tolls.

Many state legislatures have added language to the statutes that clarifies the evidence, if any, that must be included in each mailed bill. Of the same 17 surveyed statutes, only one does not outline the evidence required. Fourteen require photographic evidence of a violation, including one that requires a written report from a toll-enforcement officer; one requires evidence from the toll-collection monitoring system or a photograph; and one requires an affidavit. Alabama law is not specific on these points, giving ATRBTA flexibility in how to collect tolls.

The statute may also enact a statute of limitations. In North Carolina, the legislature specified how quickly toll bills must be sent. The person billed then has 30 days to pay or dispute the charge (e.g. the charge may be waived with evidence that someone else was driving the vehicle). If the person fails to pay or dispute the charge in a timely manner, the North Carolina Turnpike Authority (NCTA) is authorized to impose a processing fee (up to \$6 each time and \$48 total in a twelve-month period). A person with two overdue bills is subject to an additional \$25 penalty (once every six months). The person cannot renew his motor-vehicle registration unless he pays these fees. If a person contests his bill unsuccessfully, he may petition the Office of Administrative Hearings for redress. On I-95 near Miami, which is an all-transponder facility, violators (HOVs with fewer than three passengers, vehicles without transponders, or vehicles that cross lane barriers) receive a bill in the mail. If they do not pay the bill, they receive a traffic citation (NCTA 2012). Alabama code § 23-2 does not specify how quickly tolling bills must be mailed.

State legislatures often empower and circumscribe the tolling agency for specific projects. North Carolina's 2010 toll legislation authorizes NCTA to complete several specific projects while expressly prohibiting NCTA from engaging in others. It also caps toll revenues used for NCTA administration costs at 5%; prohibits tolls collected on a converted facility from being used for anything but administration of that facility; and requires a comparable, alternative, non-toll route for each turnpike project (NCTA 2012). Similarly, Connecticut legislation specifically authorizes the construction of the Governor John Davis Lodge Turnpike (CGA 2001). This is not true of Alabama's legislation, which authorizes ATRBTA to decide where to build and operate toll facilities as long as those facilities are "desirable, practicable, and economically feasible" (§ 23-2-144).

**Federal Law** Federal law also has implications for state and local toll operators. 23 USC § 129 requires a state planning to reconstruct or convert a free highway, bridge, or tunnel previously constructed with Federal funds to a toll facility to sign an agreement with Federal authorities. By law, the agreement must require the state to use toll revenues for debt service; reasonable return on private investment; and operation and maintenance, including reconstruction, resurfacing, restoration, and rehabilitation work. The agreement may authorize excess revenues to be used

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<sup>1</sup> ATI (2010) does not provide who is held liable for violations for the 17<sup>th</sup> state, Maine.

for other highway and transit purposes, conditional on the state annually certifying that the toll facility is adequately maintained. It is up to the state to determine toll rates and whether tolls are retired or continue indefinitely (FHWA 2011).

### *Pricing*

There are numerous ways to price use of a toll road, and Table 2-1 shows some typical values. The choice of pricing scheme is important because it affects toll revenue and influences driver behavior. Higher tolls result in higher revenue if enough vehicles continue to use the facility, and higher tolls can result in much higher revenue if they transform traffic jams into a free traffic flow. Because drivers are sensitive to price changes, pricing schemes can be used to encourage positive driving behavior and discourage negative driving behavior.

There are several ways to price road use: by location, distance, time, congestion pricing, other vehicle externalities such as height or number of axles, and transaction type. This section discusses pros and cons of several of these pricing options for toll roads.

**Pricing by Other Externalities** Many toll systems price facility use by the externalities each vehicle imposes. It is common to charge rates based on a vehicle's size or weight. Larger vehicles use more room on the facility, and heavier vehicles wear the road more, tend to move more slowly, and have larger safe following distances. Many toll authorities use number of axles as a proxy for size and weight (see Figure 2-7). Gas taxes roughly internalize these costs for the drivers, but tolling does a better job (Samuel 2012). However, the more categories a pricing scheme uses, the more complicated and expensive processing becomes and the more errors there are.



Figure 2-7. The North Carolina Turnpike Authority prices by number of axles

**Table 2-1. Cash toll rates by agency and facility for cars (2 axles) and commercial vehicles (5 axles) (Wilbur Smith 2009)**

Agency and Facility Name	Facility Length	Car Trip Cost	Truck Trip Cost	Car Cost per Mile	Truck Cost per Mile
Delaware Turnpike - JFK Memorial Highway (I-95)	11.2	\$ 4.00	\$ 9.00	\$ 0.357	\$ 0.804
Transportation Corridor Agencies - San Joaquin, Route 73	15.0	\$ 5.00	\$ 20.00	\$ 0.333	\$ 1.333
Miami Dade Expressway - Miami Airport Expressway - SR 112	4.2	\$ 1.25	\$ 5.00	\$ 0.298	\$ 1.190
Pocahontas Parkway (Richmond, VA)	8.8	\$ 2.50	\$ 5.50	\$ 0.284	\$ 0.625
Transportation Corridor Agencies - Route 241	24.0	\$ 6.50	\$ 22.25	\$ 0.271	\$ 0.927
Northwest Parkway (Colorado)	9.5	\$ 2.50	\$ 9.50	\$ 0.263	\$ 1.000
Dulles Greenway	14.0	\$ 3.50	\$ 10.25	\$ 0.250	\$ 0.732
Illinois State Toll Highway Authority - North-South (355) Tollway	17.6	\$ 4.00	\$ 16.00	\$ 0.227	\$ 0.909
E-470 Public Highway Authority (Colorado)	55.6	\$ 12.25	\$ 49.00	\$ 0.220	\$ 0.881
Tampa-Hillsboro Crosstown Expressway - Lee Roy Selmon Crosstown Expressway	14.0	\$ 3.00	\$ 12.00	\$ 0.214	\$ 0.857
Richmond Metropolitan Authority (Virginia) - Downtown Expressway	2.5	\$ 0.50	\$ 0.80	\$ 0.200	\$ 0.320
North Texas Tollway Authority - Dallas North Tollway (DNT)	21.0	\$ 4.05	\$ 15.00	\$ 0.193	\$ 0.714
Miami Dade Expressway - Don Shula (South Dade) Expressway - SR 874	7.3	\$ 1.25	\$ 5.00	\$ 0.171	\$ 0.685
Harris County Toll Road Authority - Sam Houston Toll Road	64.3	\$ 11.00	\$ 42.00	\$ 0.171	\$ 0.653
North Texas Tollway Authority - President George Bush Turnpike (PGBT)	30.0	\$ 5.00	\$ 20.00	\$ 0.167	\$ 0.667
Richmond Metropolitan Authority (Virginia) - Powhite Parkway	3.4	\$ 0.50	\$ 0.80	\$ 0.147	\$ 0.235
Chesapeake Expressway (Route 168) - Virginia	16.0	\$ 2.00	\$ 5.00	\$ 0.125	\$ 0.313
Greenville Southern Connector	16.0	\$ 2.00	\$ 6.00	\$ 0.125	\$ 0.375
Texas Department of Transportation - Central Texas Turnpike - SH 130	49.0	\$ 6.00	\$ 24.00	\$ 0.122	\$ 0.490
Orlando-Orange County Expressway Authority - Bee Line (SR 528)	22.6	\$ 2.75	\$ 9.00	\$ 0.122	\$ 0.398
Florida - Polk Parkway - Florida	25.0	\$ 3.00	\$ 12.00	\$ 0.120	\$ 0.480
Maryland Transportation Authority - JFK Memorial Highway	42.0	\$ 5.00	\$ 20.00	\$ 0.119	\$ 0.476
Orlando-Orange County Expressway Authority - East-West Expressway (SR 408)	22.0	\$ 2.50	\$ 8.00	\$ 0.114	\$ 0.364
New Hampshire Turnpike - Blue Star Turnpike (includes Hampton toll plaza)	15.0	\$ 1.50	\$ 4.50	\$ 0.100	\$ 0.300
South Jersey Turnpike Authority - Atlantic City Expressway	44.0	\$ 3.75	\$ 15.00	\$ 0.085	\$ 0.341
Georgia State Tollway Authority - Georgia 400 extension	6.2	\$ 0.50	\$ 2.50	\$ 0.081	\$ 0.403
Powhite Parkway Extension - Virginia DOT	10.0	\$ 0.75	\$ 1.50	\$ 0.075	\$ 0.150
New Jersey Turnpike Authority - New Jersey Turnpike	122.4	\$ 9.05	\$ 32.50	\$ 0.074	\$ 0.266
Florida's Turnpike Enterprise - Mainline	309.6	\$ 21.20	\$ 64.25	\$ 0.068	\$ 0.208
Massachusetts Turnpike Authority - Masspike (WB)	135.1	\$ 8.60	\$ 31.25	\$ 0.064	\$ 0.231
Penn. Turnpike - Mainline (I-76/I-70/I-276) - East-West section (EB direction)	357.6	\$ 22.75	\$ 90.00	\$ 0.064	\$ 0.252
Penn. Turnpike - Mainline (I-76/I-70/I-276) - East-West section (WB direction)	357.6	\$ 19.75	\$ 75.00	\$ 0.055	\$ 0.210
Illinois State Toll Highway Authority - East-West (Ronald Reagan) Tollway	98.0	\$ 5.40	\$ 27.00	\$ 0.055	\$ 0.276
Dulles Toll Road	14.0	\$ 0.75	\$ 1.75	\$ 0.054	\$ 0.125
Indiana Toll Road	156.9	\$ 8.00	\$ 27.25	\$ 0.051	\$ 0.174
New York State Thruway - Mainline (from PA State Line to NYC Line) EB/SB	496.7	\$ 25.00	\$ 132.75	\$ 0.050	\$ 0.267
Oklahoma Transportation Authority - Muskogee Turnpike	53.1	\$ 2.50	\$ 8.00	\$ 0.047	\$ 0.151
Oklahoma Transportation Authority - Bailey Turnpike	86.4	\$ 4.00	\$ 12.50	\$ 0.046	\$ 0.145
New Hampshire Turnpike - Spaulding (includes Dover & Rochester toll plaza)	33.2	\$ 1.50	\$ 6.00	\$ 0.045	\$ 0.181
Oklahoma Transportation Authority - Indian Nation Turnpike	105.2	\$ 4.75	\$ 16.00	\$ 0.045	\$ 0.152
New Hampshire Turnpike - Central (includes Hooksett & Bedford toll plazas)	44.7	\$ 2.00	\$ 7.00	\$ 0.045	\$ 0.157
Ohio Turnpike Commission	237.0	\$ 10.25	\$ 28.25	\$ 0.043	\$ 0.119
West Virginia Turnpike	88.0	\$ 3.75	\$ 12.75	\$ 0.043	\$ 0.145
Oklahoma Transportation Authority - Cimarron Turnpike	59.2	\$ 2.50	\$ 10.00	\$ 0.042	\$ 0.169
New York State Thruway - Mainline (from NYC Line to PA State Line) NB/WB	496.7	\$ 20.50	\$ 115.25	\$ 0.041	\$ 0.232
Oklahoma Transportation Authority - Will Rogers Turnpike	88.5	\$ 3.50	\$ 14.25	\$ 0.040	\$ 0.161
Kansas Turnpike Authority	236.0	\$ 9.25	\$ 28.25	\$ 0.039	\$ 0.120
Massachusetts Turnpike Authority - Masspike (EB)	135.1	\$ 5.10	\$ 22.50	\$ 0.038	\$ 0.167
Maine Turnpike Authority	106.0	\$ 4.00	\$ 16.00	\$ 0.038	\$ 0.151
Delaware Turnpike - Delaware SR 1	56.0	\$ 2.00	\$ 10.00	\$ 0.036	\$ 0.179
New Jersey Turnpike Authority - Garden State Parkway (NB)	173.0	\$ 6.00	\$ 17.50	\$ 0.035	\$ 0.101
New Jersey Turnpike Authority - Garden State Parkway (SB)	173.0	\$ 5.00	\$ 12.50	\$ 0.029	\$ 0.072

**Pricing by Transaction Type** Many toll authorities adjust the charge by method of payment. For example, the Illinois Tollway (2012) charges cars with transponders half what they charge cash customers, NCTA (2012) gives up to a 35% discount for transponder transactions, the Florida DOT (2011) gives transponders a 25-cent discount at each toll location on most of its systems and a 25% discount on its ticket systems (because ticket systems are the most expensive to operate), the New York State Thruway (2012) gives passenger-car transponder customers between a 5% and 91% discount, the New Jersey Turnpike Authority (2012) typically gives a 25% discount for passenger-car transponder transactions during off-peak hours, the Colorado DOT charges a video-tolling premium of \$0.50-\$1.50 on the Northwest Parkway and 11% on E470 (Samuel 2010), and the toll authorities in Toronto charge an extra CND\$3.80 per trip for video tolling (407 ETR 2012).

Transponder transactions are the cheapest to process, so drivers using transponders pay lower rates. But video tolls, where a bill is mailed to the owner of the registered vehicle, require extra processing, including purchasing vehicle-registration information from DMVs for as much as \$5 each from other states (Ramirez 2012); mailing bills; handling mailed payments; and in some states having an officer review the evidence before the bill is sent (Ramirez 2012). Moreover, it often takes 60 days to receive payment for a video toll (Garrett 2012). Drivers who receive a video-toll bill are typically assessed a revenue-neutral premium to cover these costs (Beaty 2012).

Pricing by transaction type not only offers drivers a way to save money; it also encourages them to switch to less costly, more efficient toll methods. Because a toll facility becomes faster, safer, and cheaper as transponder saturation increases, toll authorities use cheaper prices to encourage drivers to use transponders. With the proper incentives, an 80% transponder-saturation rate among commercial vehicles and commuters is possible in a short amount of time (Samuel 2012).

One of the deterrents to high transponder rates is the initial cost of the transponder. However, transponder prices are declining quickly, and some toll authorities are incentivizing transponders by giving them away (for example, Sinoski 2012).

### ***Customer Service Centers***

Customer service centers (CSCs) are facilities that handle day-to-day tolling activities—including managing customer accounts, providing customer service, and processing transactions—and that house the necessary equipment, network connections, software, and personnel to perform those tasks (NCTA 2012). These activities include the following:

- Open, replenish, and close accounts
- Handle refunds
- Fix or replace broken transponders
- Process transactions
- Mail bills
- Collect outstanding debts, which may involve a third-party collector or adjudicator
- Answer questions by phone or email
- Obtain registration information from the DMV, which may be out of state

- Communicate with other toll authorities to ensure interoperability and mutual enforcement of outstanding tolls
- Maintain the toll equipment

Clear business policies help ensure smooth CSC functioning. Business policies should address how to handle accounts, billing, enforcement, and toll disputes. There are many possible scenarios to cover. NCTA's business policies detail what to do with inactive accounts, returned mail, malfunctioning or missing transponders, and negative balances, among other things (NCTA 2012). The Colorado Department of Transportation (CDOT) recommends developing an incident management plan (Dailer and Hevia-Moren 2011b).

Other toll authorities have developed their business policies through experience, and Alabama might be served well by adopting many of their provisions. Often there is a process for performing tasks and a reason for that process, and diverging from that process may bring unintended consequences. However, new tolling procedures may confuse customers, so CDOT suggests organizing a forgiveness period at the beginning, giving customer service representatives the authority to override fees and penalties, and informing the public that policies can be adjusted if they do not work as expected (Dailer and Hevia-Moren 2011b).

The cost to set up the CSC can vary widely. Typical costs run between \$2 million (Garrett 2012) and \$10 million (Ramirez 2012), depending on the number and type of transactions, business rules, and so on. However, many of these CSCs are larger than Alabama may need, so ATRBTA may be able to start a CSC for less than \$1 million (Patno 2012).

The key to back-office success is to encourage customers to handle as much of their tolling business (e.g. setting up an account) online (Ramirez 2012). Online processing is cheaper and more reliable than processing that uses human operators, and the benefits of online processing are especially big for large volumes because automation scales well.

### ***Tolling Interoperability***

Systems that exclusively use toll booths do not have much problem enforcing toll payment, but open-road tolling, which uses transponders to deduct the toll from a pre-paid account or license-plate recognition to mail the bill to the vehicle's registered owner, poses a special problem: It is difficult to collect tolls from vehicles registered outside the tolling agency's jurisdiction. Many of those vehicles do not have transponders, so the toll cannot be deducted from a prepaid account; and license-plate tolling tends not to work well for those vehicles because it requires plate-registration information from other states' DMVs. Even if the tolling authority can identify and bill an out-of-state vehicle owner, it has difficulty compelling the owner to pay, and other states are unlikely to collect the toll on its behalf. The difficulty of collecting toll payments from other jurisdictions discourages tolling roads with significant out-of-state traffic, even if those roads are excellent candidates for tolling in other ways.

To address these challenges, many toll authorities are signing interoperability agreements with one another. The specifics of the agreements differ, but many interoperability agreements guarantee that a customer's transponder works across jurisdictions, that the toll authorities share

information (e.g. vehicle registration information), and that each authority will pursue outstanding tolls owed to the other signatories by drivers inside its jurisdiction. As a result, customers who use transponders are charged a lower toll, the costs of tolling decline, and the rate of collection increases. Interoperability makes open-road tolling a more attractive option.

Electronic equipment has also made interoperability more feasible. Interoperable transponders enable toll authorities to identify easily vehicles registered out of state that are on the tolled facility and deduct the toll from the transponder's account, which means higher collection rates from that hard-to-reach group. And because the transponder-toll process is electronic, it costs less than manual methods to process and collect the toll. License-plate readers are also more efficient when toll authorities share information and cooperatively enforce the tolls because they can identify vehicles on open-road facilities that lack a transponder. The toll authorities can then mail the vehicles' registered owners a bill.

Multilateral agreements are becoming the norm. The EZ-Pass Group is the largest, with 24 members in 14 states (EZ-Pass 2012), although none of its members are in the South (see Figure 2-8). However, bilateral agreements can be useful, as Toronto has shown. Toronto has a high collection rate thanks to the reciprocity agreements it has with 37 states (Patno 2012).

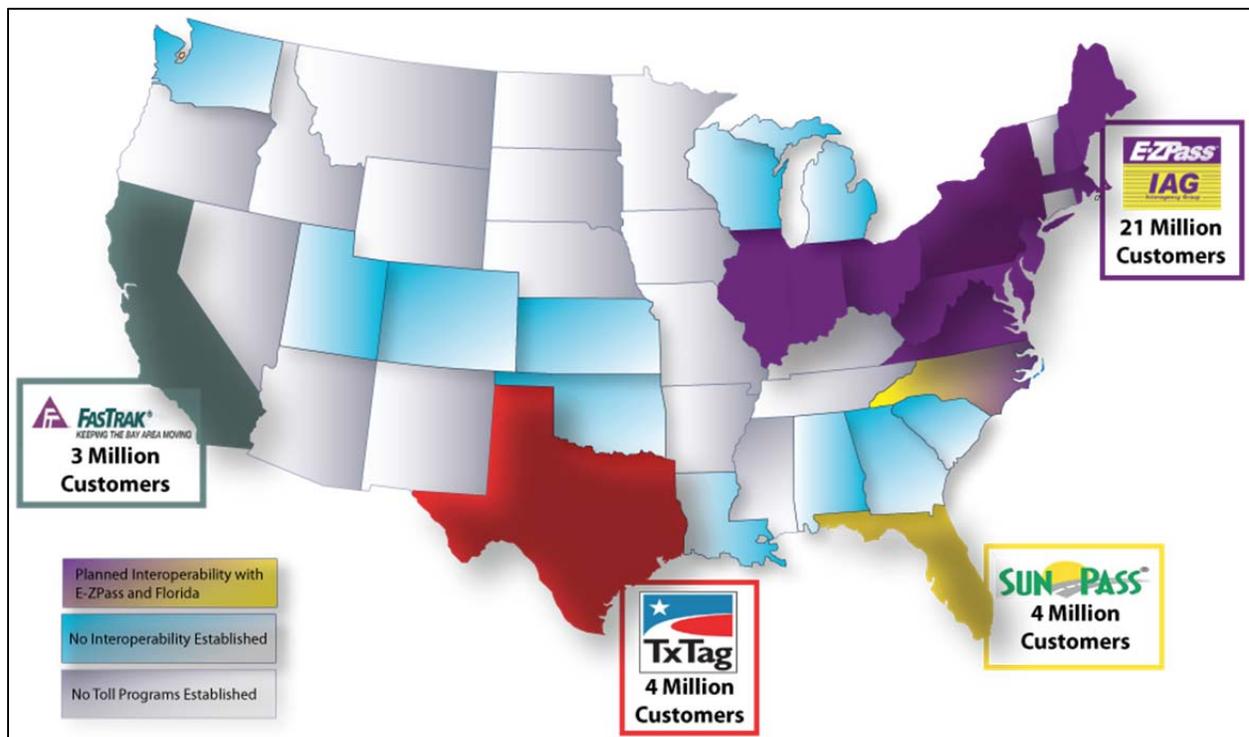


Figure 2-8. A map showing interoperability in the US (ATI 2011)

There are still challenges to tolling interoperability. The public needs to be made aware that there is interoperability, and the legal paperwork customers sign to open a transponder account may need to authorize the tolling authority to share customer data with out-of-state authorities. State- and local-level tolling agencies need business rules to handle transactions, including disputes, across toll authorities. In addition, information and research sharing among agencies

(both sharing among agencies in the same state and sharing with other states) is critical (SANDAG 2011, cited in Dailer and Hevia-Moren 2011b).

In 2010 the Alliance for Toll Interoperability (ATI), an organization dedicated to promoting and implementing interoperability for the benefit of customers and agencies, brought together over 50 participants from 19 states for discussion. The participants formed a committee, which met twice more that year. The committee came to several findings and conclusions:

- Legislation and memoranda of understand are sufficient for the time being. No compact needed yet.
- Initial participation should be at the state level.
- Civil/criminal punishment determined by individual states.
- Registration holds are the most viable enforcement mechanism.
- Due process should be determined by individual states.
- Money thresholds will be set by individual states.
- The participation of the American Association of Motor Vehicle Administrators (AAMVA) and DMVs is crucial.

The authors of this report have spoken with toll officials from the Florida Department of Transportation. Those officials expressed interest in working with Alabama and Georgia (another state that employs tolls) as an interoperability group.

### ***Project Financing***

Implementing toll facilities is expensive. There are engineering, construction, legal, and finance costs for each new project, and financing might be required to cover initial maintenance and operations. If ATRBTA builds 16 gantries at \$2 million each and a CSC at \$1 million, it will likely need well in excess of \$33 million for initial outlays. Toll authorities have numerous options when it comes to financing a new toll project.

Revenue bonds are a common source of toll funding. These are public bonds issued to finance projects that generate revenue; revenue from the project is then used to pay the bondholders. However, revenue bonds tend to be expensive to issue because revenue from toll projects is uncertain<sup>2</sup> (Sundeen and Reed 2006) and because they require an investment-grade traffic-and-revenue study (Ramirez 2012). ATRBTA may issue revenue bonds under Alabama law.

The US Government has funded toll projects. For example, the Delaware Department of Transportation recently built a gantry on an existing tolled facility, I-95, to provide drivers with an open-road option. The project cost about \$37 million and was paid for with Federal American Recovery and Reinvestment Act funds. Other Federal programs to fund transportation projects

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<sup>2</sup> Under Alabama law, neither the state nor political subdivisions in the state can pay the Authority's debts, let alone be considered liable for the Authority's debts. This means less certainty about the Authority's ability to service its debts.

include a credit program implemented under the Transportation Infrastructure Finance and Innovation Act, grant anticipation revenue vehicles bonds, and transit grant anticipation notes (Sundeen and Reed 2006).

Special taxes have been used to fund toll projects. For example, San Diego voters approved a half-cent sales tax in 2004 that helped build express lanes on I-15 (TransNet 2012). There are also several other unusual options: advertising, concessions at rest areas, naming rights, and shared-resource agreements. Shared-resource agreements give telecommunications companies right-of-way access in exchange for revenue or in-kind donations (Sundeen and Reed 2006).

For details on these and other funding options, see Sundeen and Reed (2006).

### ***Potential Drawbacks***

There are several potential drawbacks to tolling roads. First is public opposition. As Zmud (2008) notes, “we have now reached a threshold where the major constraint on the successful implementation of tolling and road-pricing proposals relates largely to policymaking rather than to technical or administrative barriers.” This sentiment is especially true among populations with little opportunity to use toll roads (Zmud and Arce 2008), which may explain why there is more support for tolling in the West than in the South (Zmud 2008). For example, a recent survey conducted in Texas found that more than 70% of Texans oppose tolling roads that are currently free (Podgorski and Kockelman 2006), a result that is consistent with over 30 other public-opinion surveys conducted around the world (Zmud 2008).

Despite these concerns, there is evidence that public opposition to tolling is generally overstated. These survey results depend on several factors, including who sponsored the poll, whether “potential users” or the general public were polled, and whether the question gave context or additional information (Zmud 2008; Harrington, *et al.* 2001). Public support is much easier to obtain for a tolling program aimed at a specific improvement project because people can see what they are getting in return (Samuel 2012). Zmud and Arce (2008) find that most surveys with high validity show majority support for tolling.

Indeed, it is not even clear how much initial public opposition matters. Ungemah and Collier (2007) look at three cases (California, Minnesota, and Colorado) where there was skepticism and opposition initially and find that 1) planners were still able to move forward cautiously and 2) public opinion reversed in the end. Ungemah, *et al.* (2005) and Odeck and Brathen (1997) provide additional evidence that support for toll roads increases over time. Political acceptance is more likely when the toll projects have a fairly simple design, build on previous experience, address clearly understood and widely supported objectives, and have transportation financial practices that facilitate public trust in the use of the project’s revenues (Small and Gomez-Ibanez 1994, cited in Ungemah and Collier 2007).

The second potential drawback is the disproportionate impact tolls may have on low-income individuals (Franklin 2007; Richmond PSL 2012). However, there is reason to believe that previous estimates overstate regressivity (Plotnick, *et al.* 2011) and opposition to regressivity (Ungemah, *et al.* 2005). Tolls may be less regressive than current funding practices (Schweitzer

and Taylor 2008): motor-fuel taxes are more regressive because low-income individuals tend to own older, less fuel-efficient cars than high-income individuals (FHWA 2009), and sales taxes are more regressive because they spread infrastructure costs across consumers rather than just users (Schweitzer and Taylor 2008). Affluent users bear the heaviest cost in toll systems (Deakin and Harvey 1996; Safirova, *et al.* 2003; and Transek 2006, cited in FHWA 2009). Indeed, polling data suggest that low-income users are more likely to prefer tolls to taxes than high-income users (Taniguchi 2008).

The final potential obstacle is the US Government. As mentioned in the Legislation section of this chapter, Federal law prohibits states to convert a free highway, bridge, or tunnel previously constructed with Federal funds to a toll facility without Federal permission, and Federal authorities generally oppose tolling existing interstate. The Federal Government generally opposes tolling existing interstate (Chester and Elizer 2012, Patno 2012), especially where there is heavy traffic from out of state because tolling there favors intrastate commerce over interstate commerce (Timothy 2012) and because it could lead to interstate tolling wars (WTNH 2012). In 2011, Rhode Island requested Federal permission to toll I-95 near the Connecticut border<sup>3</sup> but did not receive it, and US Secretary of Transportation Ray LaHood told a Rhode Island news station that, "If a state or a governor or DOT wants to add capacity or two lanes on each side, we think that's a good use of tolls and we have supported that kind of approach. We don't support the kind of approach, though, for roads that have already been built with taxpayer dollars then to be tolled" (WPRI 2011).

There are a few exceptions. FHWA has established pilot programs to explore the effect of tolls on various outcomes:

- Value Pricing Pilot Program: provides funding to study and implement 15 programs that are intended to reduce congestion through tolls and other pricing mechanisms (FHWA d). Applicants must show that an existing facility is overburdened and that they plan to use variable pricing to mitigate the congestion to receive approval (Timothy 2012). There is one program slot remaining (FHWA d).
- Interstate System Reconstruction & Rehabilitation Program: allows up to three existing Interstate facilities to be tolled to fund needed reconstruction or rehabilitation on Interstate highway corridors that otherwise could not be properly maintained/improved (FHWA c). All three slots are reserved, for Missouri (FHWA 2011a), North Carolina (FHWA 2011b), and Virginia (FHWA 2011d).
- Interstate System Construction Toll Pilot Program: authorizes tolling on up to three Interstate facilities to finance the construction of new Interstate highways. Applicants must show that tolling is the most efficient and economical way to fund the project to receive approval. One state may apply, or several states may jointly apply (FHWA b). South Carolina has one slot; two slots remain open.

Darren Timothy, a member of the FHWA Tolling and Pricing Program team, said these are the only ways to toll existing, free Interstate facilities (Timothy 2012).

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<sup>3</sup> Rhode Island chose that location because two-thirds of the traffic is from out of state (Samuel 2011).

There are state DOTs that toll Interstate outside these programs, but their Interstates were built with state funds (FHWA a). For example, Delaware generates 27% of its DOT revenues by tolling I-95 (Timothy 2012), but it built the facility without using Federal dollars. If Alabama wants to generate revenue for ALDOT by placing tolls near its borders, it may need to build a new facility, such as a bridge, and toll that facility (Patno 2012).

## **Chapter 3**

### **Alternative Revenue Sources**

#### **Introduction**

With increasingly more fuel efficient vehicles being driven on the roads today, the revenue sources and models that were established decades ago to fund road systems across the country, primarily based on fuel sales and consumption, result in significant shortfalls between revenues and expenditures. Furthermore, according to some studies, car ownership and vehicle miles driven could be peaking in the United States. Given these trends, the Alabama Department of Transportation (ALDOT)'s current gap between revenues and expenditures of about \$50 million could escalate to over \$1 billion by the year 2025. It is imperative that the Department's policies and funding sources be examined in terms of prospects to meet and fund these shortfalls.

There is a twofold problem: first, excise taxes on gasoline and diesel fuel have not kept up with ever-escalating highway construction and maintenance costs. Second, greatly increased fuel efficiency of vehicles and increasing use of hybrid and electric cars results in lower fuel usage and therefore reduced revenues based on gasoline sales. Federal tax rates, at 18.4 cents per gallon for gasoline and 24.4 cents per gallon for diesel have not changed since 1993. Similarly, Alabama's excise tax of 18 cents on gasoline and 19 cents on diesel has not changed since 1992. Different states have enacted various measures to help plug the shortfall in revenues. Some of these measures include more reliance on registration and tag fees, road usage fees that depend on miles driven, and/or sales taxes. According to the Congressional Budget Office, gas tax revenues nationwide will most likely fall by approximately \$57 billion over the next 10 to 11 years.

#### **Current Revenue Sources**

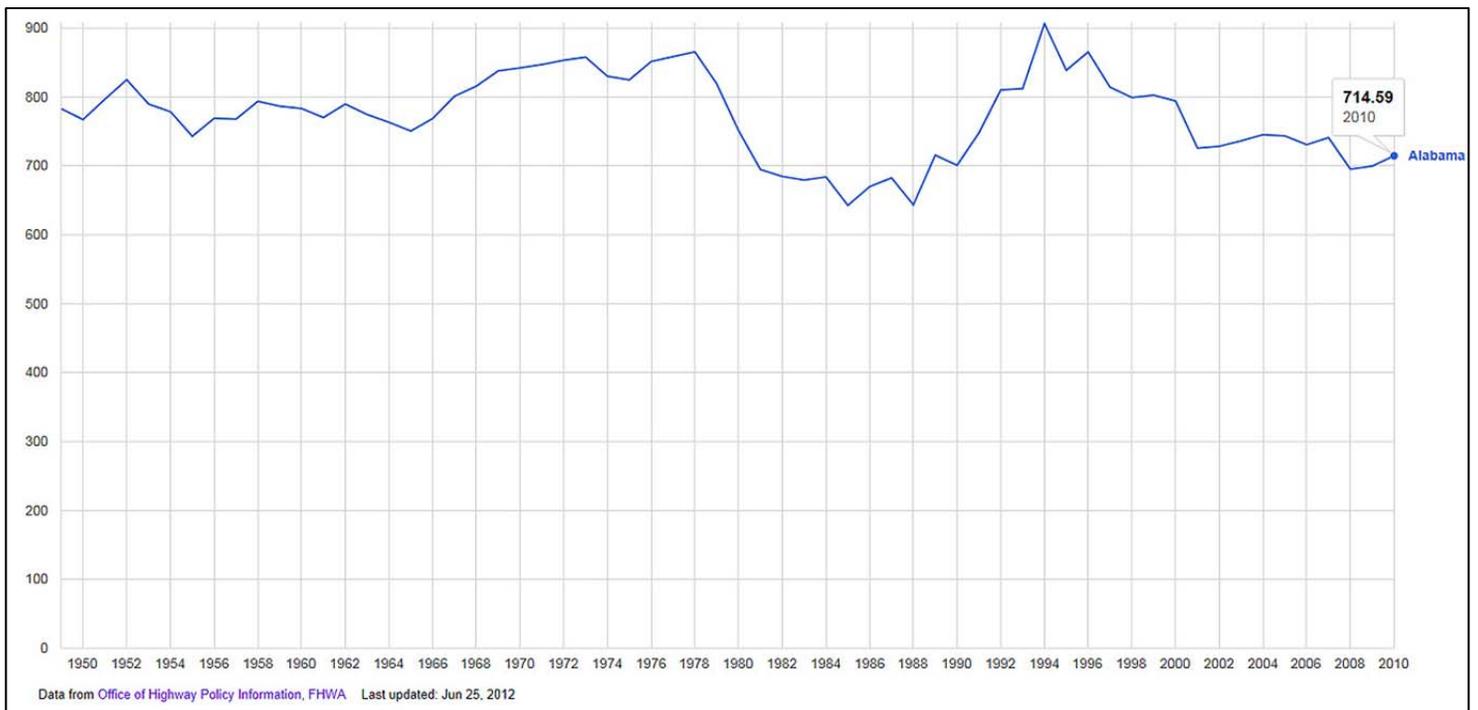
After a review of Alabama's motor fuel sales data, this chapter will present a projection of ALDOT's future revenues based on ALDOT's current sources of revenues. The chapter then presents alternative projections made under different policy assumptions. These scenarios include indexing various sources of revenues using the consumer price index; indexing using the construction cost index for land transportation; implementation of a sales tax on gasoline consumption; an increase in the excise tax on gasoline and diesel; and a road usage fee, a concept very similar to tolls.

Before any alternative sources of revenues and their impacts could be determined, the first step was to produce a baseline scenario of projections for all current sources of ALDOT revenues, including Federal aid. A structural equations model was constructed with a set of regression equations for each source of revenue that determines total revenues for ALDOT, including funds

provided by the Federal government. The primary drivers for these equations were both U.S. and Alabama economic conditions that have an impact on such factors as transportation activity (trucking, shipping etc.), gas prices, consumer and business spending, and other demand side variables. Most of the variables used are susceptible to changes in economic conditions and therefore have a direct impact on gasoline prices and other sources of revenue for ALDOT.

Some of the exogenous variables considered and included were the overall economic growth rates of both the U.S. and Alabama economies; overall consumer spending; consumer spending on gasoline; demand for alternative sources of energy; and a linear time trend.

Figures 3-1 through 3-6 present historical trends in fuel usage and consumption in Alabama. These trends were used to create a projection of future ALDOT revenues.



**Figure 3-1. Alabama fuel use per vehicle (gallons)**

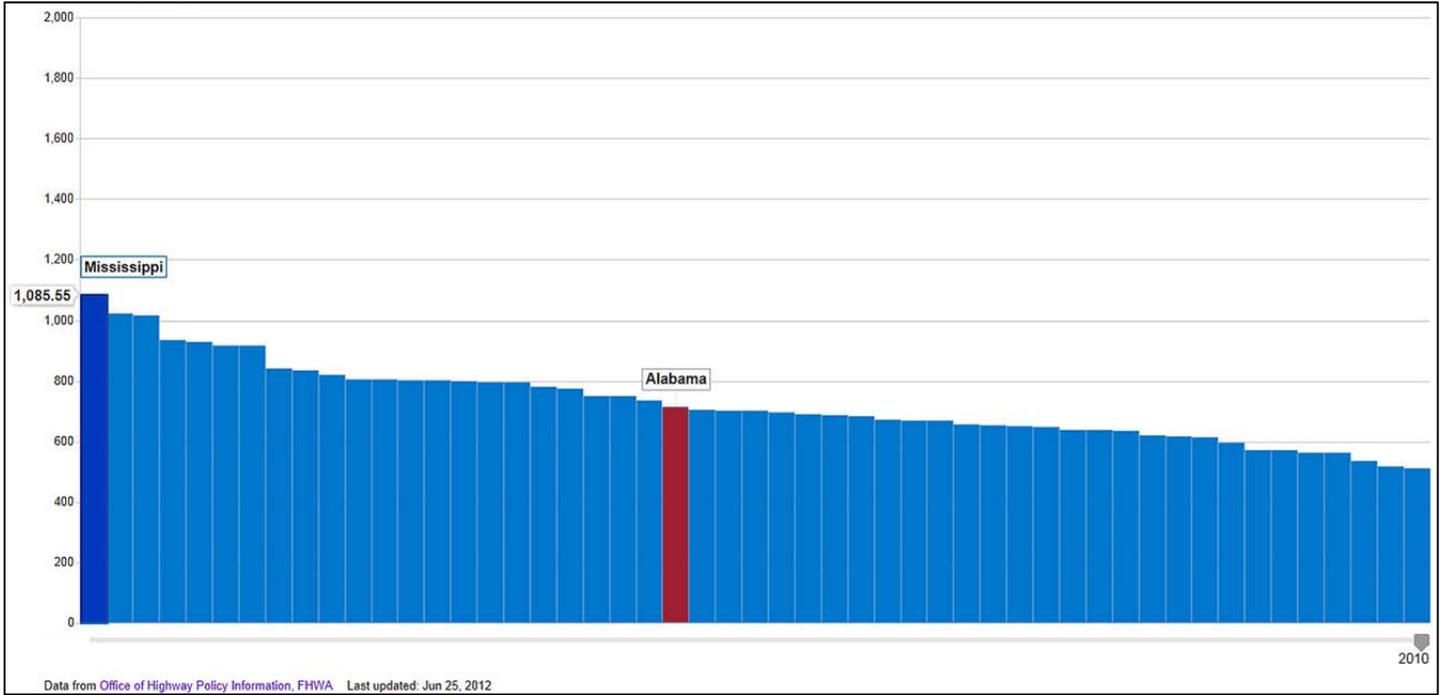


Figure 3-2. Fuel use per vehicle by state, 2010 (gallons)

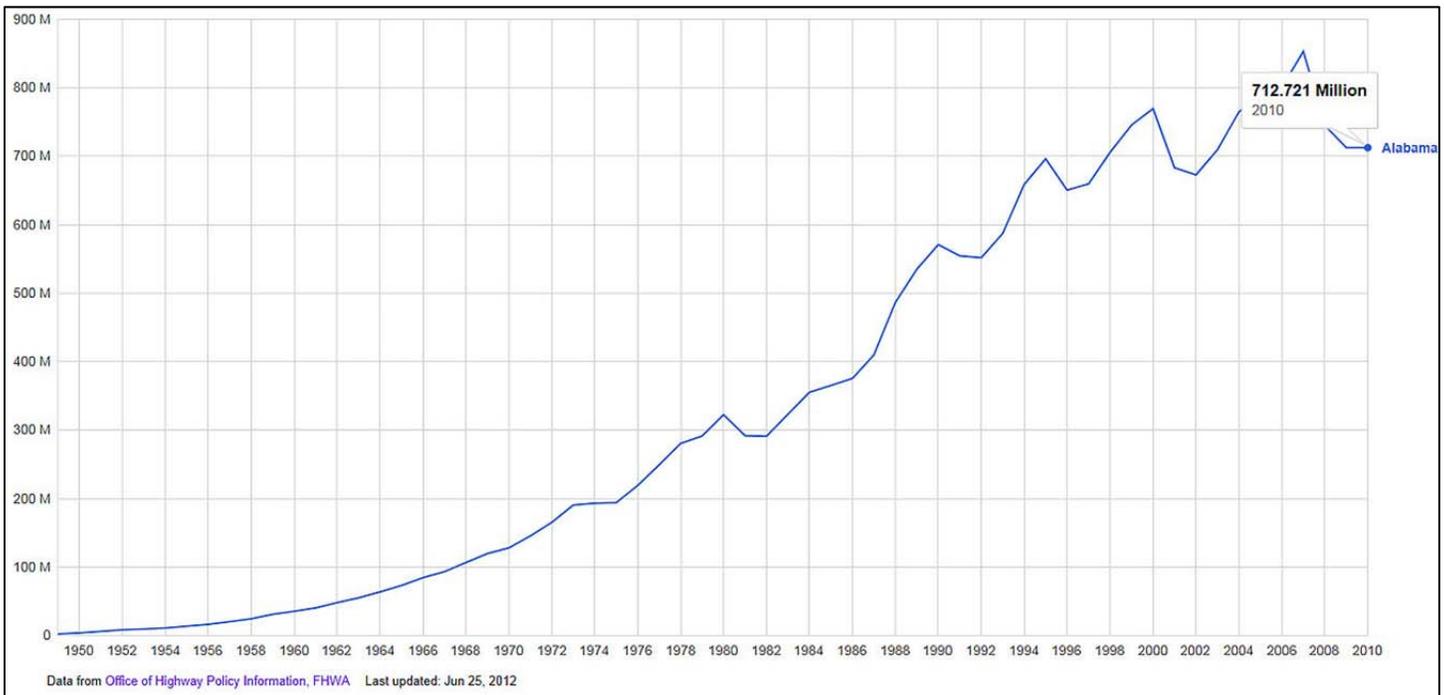


Figure 3-3. Alabama diesel sales (gallons)

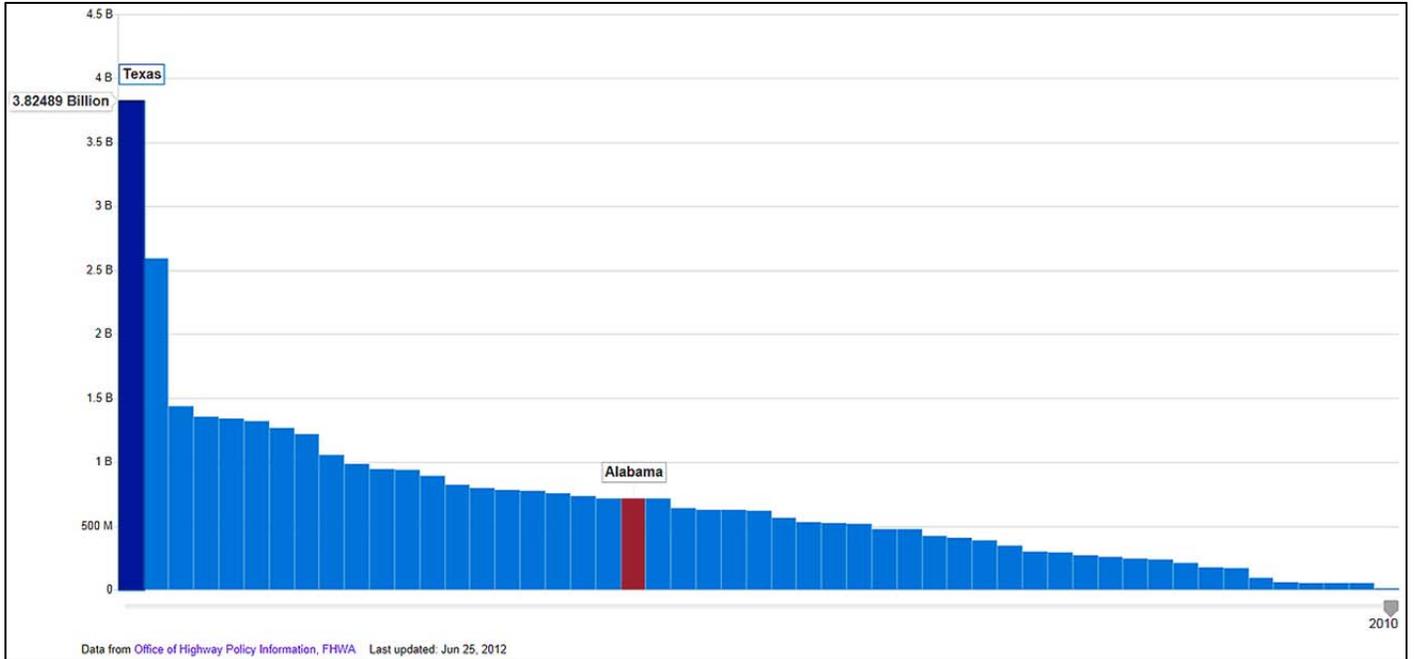


Figure 3-4. Gallons of diesel sold by state, 2010

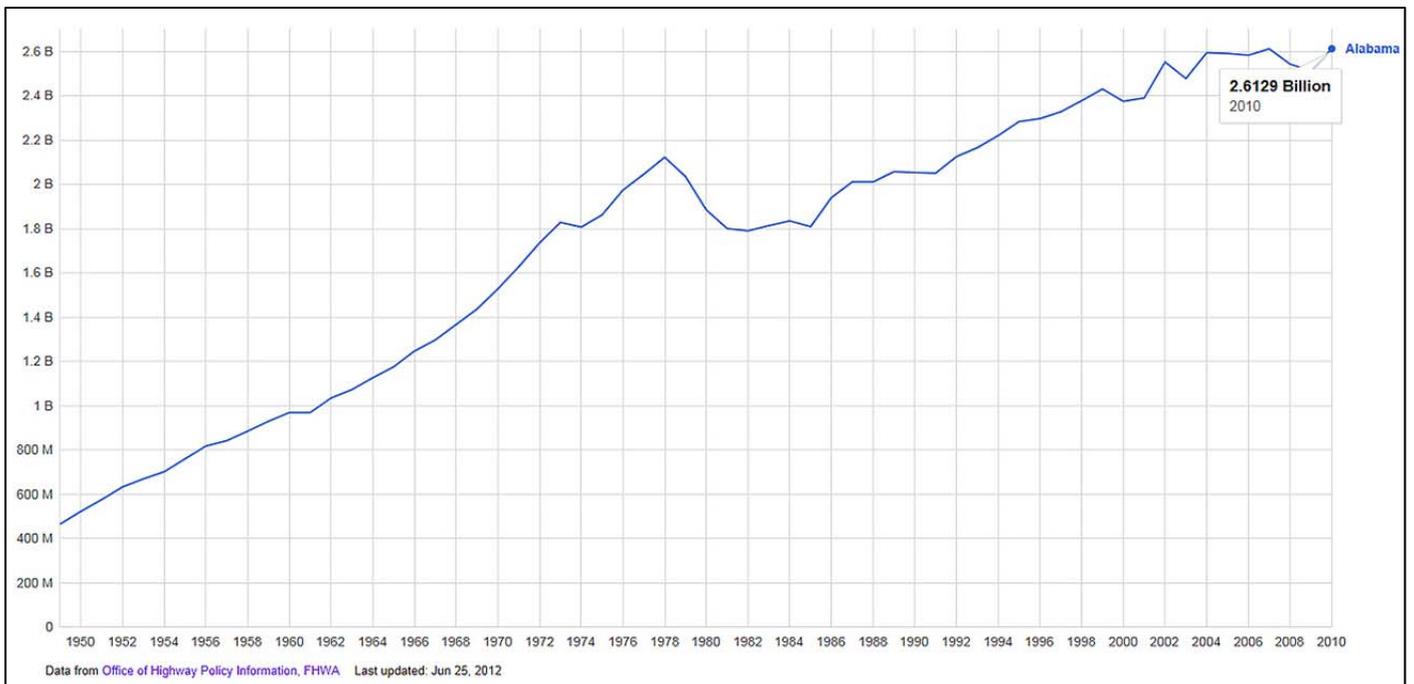


Figure 3-5. Alabama gasoline sales (gallons)

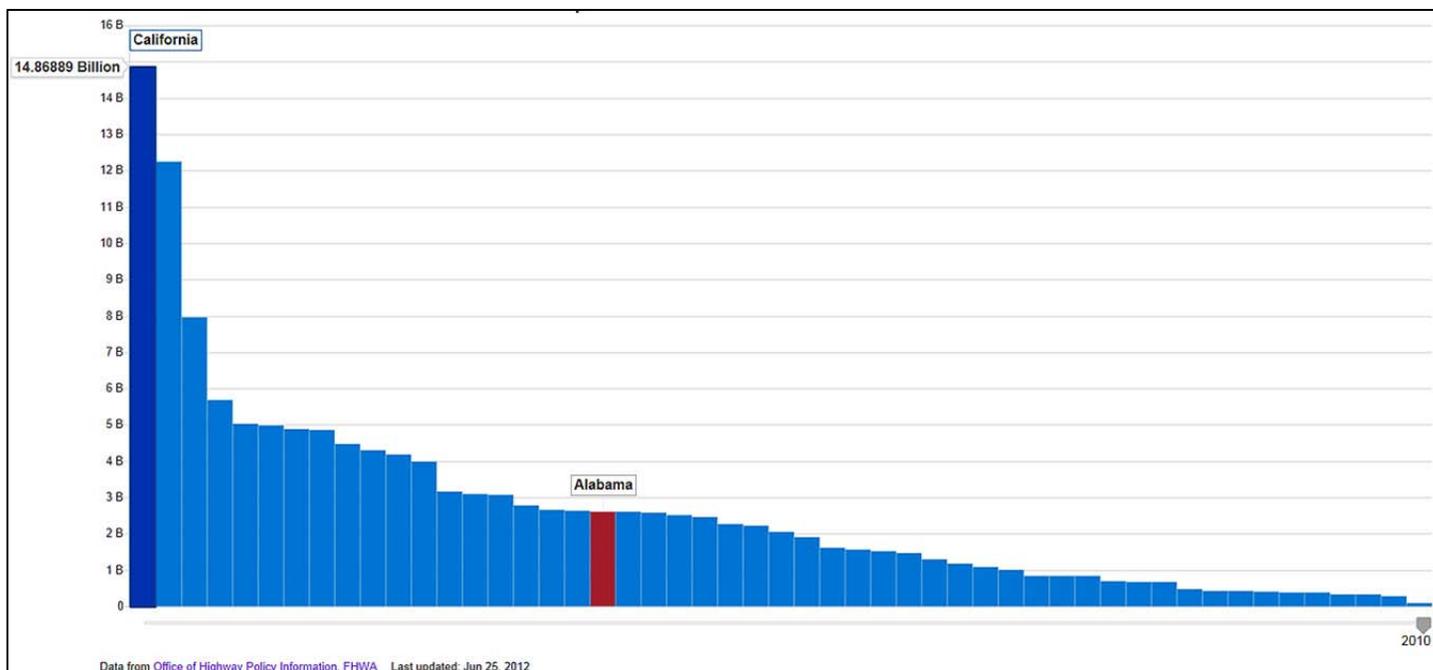
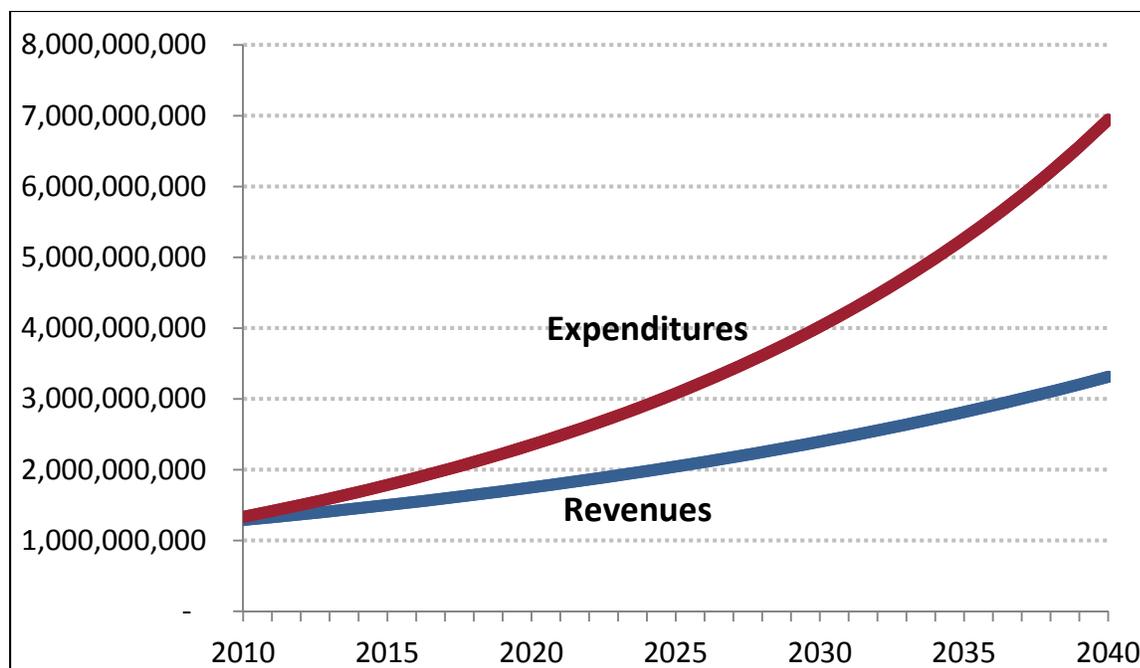


Figure 3-6. Gallons of gasoline sold by state, 2010

### Baseline Projections

The baseline projections of ALDOT revenues based on its current revenue sources are presented in Table 3-1 for every 10-year interval. The table provides projections for each revenue component, as well as total revenue. Total revenues for ALDOT are expected to increase from \$1.3 billion in 2010 to \$1.75 billion in 2020. UA researchers also projected ALDOT expenditures, although the background and details of that projection are not presented here. Figure 3-7 shows the widening gap between the baseline revenue forecasts and expenditure forecasts from 2010 to 2040. As shown in the figure, without significant changes made to the current revenue sources and considering the increasing fuel efficiency of vehicles, the gap between revenues and expenditures could be over 3.0 billion dollars by the year 2040.

Once the baseline revenues were established, the researchers investigated changing the rates of current revenue sources or adding new sources to examine whether or not those changes could make a significant upward impact on ALDOT’s revenues. Those investigations are presented in the following sections.



**Figure 3-7. Projected ALDOT revenues and expenditures (current dollars)**

Source: The Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

**Table 3-1. ALDOT baseline revenues and projections (current or nominal dollars)**

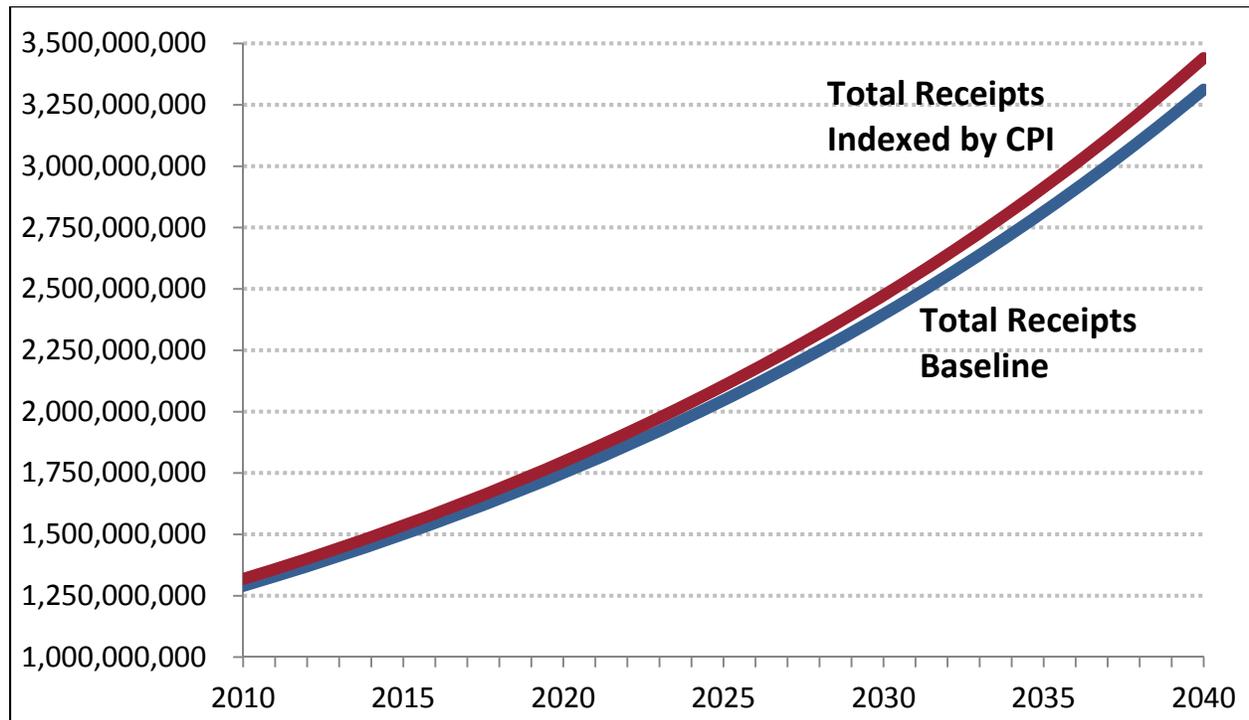
	2005	2010	2020	2030	2040
<b>Gasoline Excise Tax \$0.05</b>	95,954,976	98,861,280	161,544,992	264,628,705	432,312,418
<b>Gasoline Excise Tax \$0.04</b>	44,949,994	44,721,335	51,616,858	59,677,735	69,028,618
<b>Motor Fuel Tax \$0.06</b>	42,675,146	35,627,835	53,549,263	80,406,721	120,712,653
<b>LPG Gas Vehicle Permits</b>	140,948	97,344	102,541	108,061	113,811
<b>Motor Vehicle License</b>	81,357,173	109,131,388	157,134,570	226,337,752	326,140,934
<b>Gasoline Excise Tax \$0.07</b>	76,849,327	75,965,342	82,374,491	89,313,640	96,842,790
<b>Lubrication Oil Tax</b>	591,407	497,374	817,927	1,344,910	2,211,393
<b>Oversize Hauling Permits</b>	2,936,092	3,488,393	4,932,037	6,974,681	9,860,324
<b>Motor Carrier Mileage Taxes, Fees</b>	521,334	603,184	986,165	1,613,763	2,637,677
<b>Motor Fuel Tax \$0.13</b>	100,401,300	81,690,779	121,387,778	180,081,656	267,555,509
<b>Truck Identification Decals</b>	953,320	852,528	1,393,028	2,278,860	3,729,003
<b>Petroleum Products Inspection Fees</b>	49,515,365	47,340,251	48,895,420	50,527,125	52,203,900
<b>Outdoor Advertising Permit Fee</b>	67,398	67,863	73,841	80,124	87,070
<b>Total Revenue Receipts</b>	<b>496,913,780</b>	<b>498,944,894</b>	<b>684,808,912</b>	<b>963,373,734</b>	<b>1,383,436,099</b>
<b>Federal Aid</b>	<b>630,383,267</b>	<b>763,069,001</b>	<b>1,027,703,399</b>	<b>1,384,237,798</b>	<b>1,863,272,196</b>
<b>Other Receipts</b>	98,521,054	28,319,154	37,501,031	49,726,869	65,851,737
<b>Subtotal</b>	728,904,321	791,388,155	1,065,204,430	1,433,964,667	1,929,123,934
<b>Total Receipts</b>	<b>1,225,818,101</b>	<b>1,290,333,049</b>	<b>1,750,013,342</b>	<b>2,397,338,401</b>	<b>3,312,560,032</b>

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

## Indexing Based on the Consumer Price Index (CPI)

This scenario is based on assumptions that the true value and growth in sources of revenue actually diminish over time due to increases in price levels. Therefore, to keep up with the changing price levels, ALDOT's current revenue sources could be indexed to consumer price levels or the rate of inflation in maintain the purchasing power of the funds and revenue sources received by ALDOT. However, indexing is a long term solution and will not alleviate budget shortfall problems in the near future.

The projections for indexed revenue sources are presented in Table 3-2, while Table 3-3 presents the difference between the revenue projections obtained under the baseline scenario and those estimated by indexing. Because indexing has not been performed historically in Alabama, it will take a few years for the benefits of indexing to be reflected in the revenue sources, as indicated in Figure 3-8. As shown in Table 3-2, revenues for the year 2020 could reach almost \$1.8 billion with indexing, compared to the baseline forecast of \$1.75 billion, for an increase of \$46 million. That differential could grow to around \$128 million in 2040, as seen in Table 3-3.



**Figure 3-8. Projected ALDOT revenues and expenditures (current dollars)**

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

**Table 3-2. ALDOT revenues indexed by consumer price index (current dollars)**

	2005	2010	2020	2030	2040
<b>Gasoline Excise Tax \$0.05</b>	97,826,098	101,016,455	165,809,780	273,070,361	449,042,908
<b>Gasoline Excise Tax \$0.04</b>	45,826,519	45,696,260	52,979,543	61,581,455	71,700,025
<b>Motor Fuel Tax \$0.06</b>	43,507,311	36,404,522	54,962,964	82,971,695	125,384,232
<b>LPG Gas Vehicle Permits</b>	143,696	99,466	105,248	111,508	118,215
<b>Motor Vehicle License</b>	82,943,638	111,510,452	161,282,923	233,557,927	338,762,589
<b>Gasoline Excise Tax \$0.07</b>	78,347,889	77,621,386	84,549,178	92,162,745	100,590,606
<b>Lubrication Oil Tax</b>	602,939	508,216	839,520	1,387,812	2,296,974
<b>Oversize Hauling Permits</b>	2,993,346	3,564,440	5,062,243	7,197,173	10,241,919
<b>Motor Carrier Mileage Taxes, Fees</b>	531,500	616,333	1,012,200	1,665,242	2,739,756
<b>Motor Fuel Tax \$0.13</b>	102,359,125	83,471,638	124,592,415	185,826,261	277,909,907
<b>Truck Identification Decals</b>	971,910	871,113	1,429,804	2,351,556	3,873,315
<b>Petroleum Products Inspection Fees</b>	50,480,915	48,372,268	50,186,259	52,138,941	54,224,191
<b>Outdoor Advertising Permit Fee</b>	68,712	69,342	75,791	82,680	90,440
<b>Total Revenue Receipts</b>	506,603,599	509,821,893	702,887,867	994,105,356	1,436,975,076
<b>Federal Aid</b>	642,675,741	779,703,905	1,054,834,769	1,428,394,984	1,935,380,830
<b>Other Receipts</b>	100,442,215	28,936,512	38,491,058	51,313,156	68,400,200
<b>Subtotal</b>	743,117,955	808,640,417	1,093,325,827	1,479,708,140	2,003,781,030
<b>Total Receipts</b>	1,249,721,554	1,318,462,310	1,796,213,694	2,473,813,496	3,440,756,106

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

**Table 3-3. Additional revenue generated by indexing gasoline-related taxes (current dollars)**

	2005	2010	2020	2030	2040
<b>Gasoline Excise Tax \$0.05</b>	1,871,122	2,155,176	4,264,788	8,441,656	16,730,491
<b>Gasoline Excise Tax \$0.04</b>	876,525	974,925	1,362,685	1,903,720	2,671,408
<b>Motor Fuel Tax \$0.06</b>	832,165	776,687	1,413,701	2,564,974	4,671,580
<b>LPG Gas Vehicle Permits</b>	2,748	2,122	2,707	3,447	4,404
<b>Motor Vehicle License</b>	1,586,465	2,379,064	4,148,353	7,220,174	12,621,654
<b>Gasoline Excise Tax \$0.07</b>	1,498,562	1,656,044	2,174,687	2,849,105	3,747,816
<b>Lubrication Oil Tax</b>	11,532	10,843	21,593	42,903	85,581
<b>Oversize Hauling Permits</b>	57,254	76,047	130,206	222,492	381,595
<b>Motor Carrier Mileage Taxes, Fees</b>	10,166	13,149	26,035	51,479	102,078
<b>Motor Fuel Tax \$0.13</b>	1,957,825	1,780,859	3,204,637	5,744,605	10,354,398
<b>Truck Identification Decals</b>	18,590	18,585	36,776	72,696	144,312
<b>Petroleum Products Inspection Fees</b>	965,550	1,032,017	1,290,839	1,611,815	2,020,291
<b>Outdoor Advertising Permit Fee</b>	1,314	1,479	1,949	2,556	3,370
<b>Total Revenue Receipts</b>	9,689,819	10,876,999	18,078,955	30,731,622	53,538,977
<b>Federal Aid</b>	12,292,474	16,634,904	27,131,370	44,157,186	72,108,634
<b>Other Receipts</b>	1,921,161	617,358	990,027	1,586,287	2,548,462
<b>Subtotal</b>	14,213,634	17,252,262	28,121,397	45,743,473	74,657,096
<b>Total Receipts</b>	23,903,453	28,129,260	46,200,352	76,475,095	128,196,073

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

## Indexing based on Price Index of Construction Cost (Land Transportation)

Because construction costs may escalate at rates higher than the ordinary inflation rate, an alternative scenario was also estimated by indexing using the construction cost index. As with indexing based on the Consumer Price Index, this scenario assumes that the true value and growth in sources of revenue actually diminishes over time relative to expenditures. In this case, increases in construction costs of various projects are not captured by the increase in ALDOT revenues. Therefore, to keep up with changing construction costs, revenue sources could be indexed by a construction cost index to maintain their purchasing power.

The projections for construction cost-indexed revenue sources are presented in Table 3-4. Because indexing has not been performed historically in Alabama, it would take a few years for the true benefits of indexing to show up in the revenue sources. For the year 2020, indexing by construction costs will raise revenues from \$1.75 billion under the baseline assumption to approximately \$1.775 billion, an increase of only about \$25 million. As demonstrated previously, the CPI indexing scenario raised revenue by a projected \$46 million in 2020, so construction cost indexing appears to be a poorer alternative than CPI indexing.

**Table 3-4. ALDOT revenues indexed by construction price index for land transportation**

	2005	2010	2020	2030	2040
<b>Gasoline Excise Tax \$0.05</b>	96,914,526	99,964,176	163,876,248	269,497,344	442,473,489
<b>Gasoline Excise Tax \$0.04</b>	45,399,494	45,220,246	52,361,741	60,775,686	70,651,066
<b>Motor Fuel Tax \$0.06</b>	43,101,897	36,025,299	54,322,033	81,886,044	123,549,883
<b>LPG Gas Vehicle Permits</b>	142,357	98,430	104,021	110,049	116,486
<b>Motor Vehicle License</b>	82,170,745	110,348,858	159,402,179	230,501,914	333,806,551
<b>Gasoline Excise Tax \$0.07</b>	77,617,820	76,812,811	83,563,237	90,956,833	99,118,983
<b>Lubrication Oil Tax</b>	597,321	502,922	829,730	1,369,653	2,263,369
<b>Oversize Hauling Permits</b>	2,965,453	3,527,310	5,003,211	7,103,001	10,092,081
<b>Motor Carrier Mileage Taxes, Fees</b>	526,547	609,913	1,000,397	1,643,453	2,699,673
<b>Motor Fuel Tax \$0.13</b>	101,405,313	82,602,121	123,139,525	183,394,798	273,844,133
<b>Truck Identification Decals</b>	962,853	862,038	1,413,130	2,320,787	3,816,649
<b>Petroleum Products Inspection Fees</b>	50,010,519	47,868,379	49,601,030	51,456,723	53,430,900
<b>Outdoor Advertising Permit Fee</b>	68,072	68,620	74,907	81,599	89,116
<b>Total Revenue Receipts</b>	501,882,918	504,511,124	694,691,389	981,097,884	1,415,952,381
<b>Federal Aid</b>	636,687,100	771,581,799	1,042,534,187	1,409,705,005	1,907,066,546
<b>Other Receipts</b>	99,506,265	28,635,082	38,042,208	50,641,744	67,399,517
<b>Subtotal</b>	736,193,364	800,216,881	1,080,576,395	1,460,346,749	1,974,466,063
<b>Total Receipts</b>	1,238,076,282	1,304,728,005	1,775,267,784	2,441,444,633	3,390,418,443

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

## Implementation of Sales Tax on Gasoline and Diesel Fuel Purchases

This revenue-enhancement scenario is estimated based on the assumption that a gasoline sales tax, similar to the general sales tax levied by state and local tax jurisdictions, can be applied on gasoline, gasohol, and diesel fuel sales. (Some studies have also suggested applying the sales tax

to oil instead of gasoline.) As of 2010, approximately 2.6 billion gallons of gasoline and 714 million gallons of diesel were sold annually in Alabama, with total sales volumes being about \$7.34 billion and \$2.13 billion, respectively. Currently, both gasoline and gasohol are taxed at 18 cents per gallon, while diesel fuel is taxed at 19 cents per gallon. Assuming a 4.0 percent sales tax will be implemented on gasoline and diesel purchases in addition to existing taxes, revenues could possibly increase by over \$380 million. However, that value is a gross estimate because the excise tax currently levied on gasoline and diesel must be removed if a sales-type tax is applied. As a further consideration, sales taxes on the consumption of gasoline can fluctuate a great deal because fuel prices rise and fall depending upon economic conditions.

Because gasoline prices can fluctuate both up and down, over a long period of time the real price of gasoline, after adjusting for inflation, could stay constant or decline, rather than increase. Fluctuations in real prices thereby significantly impact the potential revenues collected from sales taxes on gasoline and diesel fuel. However, despite some limitations, this option seems much more viable than indexing.

### **Increase in Excise Tax on Gasoline and Diesel Fuel**

Another option involves increasing the excise tax collected on both gasoline and diesel fuels. Currently the excise tax on gasoline sales in Alabama is 18 cents per gallon while diesel fuel is taxed at 19 cents per gallon. As shown in Figure 3-9 and Table 3-5, Alabama ranks 41st, tied with Oklahoma and South Carolina, in terms of excise taxes on gasoline. On diesel excise taxes, the state ranks 33rd, as seen in Figure 3-10 and Table 3-6. State taxes are significantly below the U.S. average of 21.2 cents on gasoline and 21.8 cents on diesel fuel. North Carolina has the highest excise tax on gasoline at 38.9 cents while Connecticut, at 46.2 cents, has the highest excise tax on diesel fuel.

Given gasoline sales in Alabama totaling around 2.6 billion gallons in 2010 and diesel fuel sales of 713 million gallons, a one cent increase in the excise tax on gasoline can generate an additional \$26 million in revenue per year. And an additional one cent tax on diesel fuel will generate \$7.1 million in new revenue. However, these estimates are based on the assumption that the current levels of gasoline and diesel sales will remain constant. Increasing fuel efficiency could dampen these forecasts, although the effects of price fluctuations are involved only to the extent that they impact demand. Still, this option also seems to have better prospects than indexing.



**Table 3-5. Gasoline taxes and fees by state (cents)**

Ranking	State	Excise Tax	Other Taxes and Fees	Total
1	N.Y.	8.1	40.9	49
2	Calif.	35.7	12.9	48.6
2	Conn.	25	23.6	48.6
3	Hawaii	17	30.1	47.1
4	Mich.	19	20.4	39.4
4	N.C.	38.9	0.3	39.2
5	Ill.	19	19.9	38.9
5	Ind.	18	20.9	38.9
6	Wash.	37.5	0	37.5
7	Fla.	4	31	35
8	W.Va.	20.5	12.9	33.4
9	Nev.	23	10.1	33.1
10	R.I.	32	1	33
11	Wis.	30.9	2	32.9
12	Pa.	12	20.3	32.3
13	Maine	30	1.5	31.5
14	Ore.	30	1	31
15	Ga.	7.5	21.9	29.4
16	Minn.	28	0.1	28.1
17	Ohio	28	0	28
18	Ky.	26.4	1.4	27.8
18	Mont.	27	0.8	27.8
19	Nebr.	26.7	0.9	27.6
20	Vt.	19	7.1	26.1
21	Idaho	25	0	25
21	Kans.	24	1	25
22	Utah	24.5	0	24.5
23	S.D.	22	2	24
24	Md.	23.5	0	23.5
24	Mass.	21	2.5	23.5
24	D.C.	23.5	0	23.5
25	Del.	23	0	23
25	N.D.	23	0	23
26	Colo.	22	0	22
26	Iowa	21	1	22
27	Ark.	21.5	0.3	21.8
28	Tenn.	20	1.4	21.4
<b>29</b>	<b>Ala.</b>	<b>16</b>	<b>4.9</b>	<b>20.9</b>
30	La.	20	0	20
30	Tex.	20	0	20
31	Va.	17.5	2.3	19.8
32	N.H.	18	1.6	19.6
33	Ariz.	18	1	19
34	N.M.	17	1.9	18.9
35	Miss.	18	0.8	18.8
36	Mo.	17	0.3	17.3
37	Okla.	16	1	17
38	S.C.	16	0.8	16.8
39	N.J.	10.5	4	14.5
40	Wyo.	13	1	14
41	Alaska	8	0	8

Source: American Petroleum Institute, January 2012

**Table 3-6. Diesel taxes and fees by state (cents)**

Ranking	State	Excise Tax
1	Conn.	46.2
2	N.C.	38.9
3	Wash.	37.5
4	R.I.	32
5	Maine	31.2
6	Wis.	30.9
7	Ore.	30
8	Minn.	28
8	Ohio	28
9	Mont.	27.75
10	Nev.	27
11	Nebr.	26.7
12	Ariz.	26
12	Kans.	26
13	Vt.	25
13	Idaho	25
14	Utah	24.5
15	Md.	24.25
16	D.C.	23.5
17	Ky.	23.4
18	N.D.	23
19	Iowa	22.5
19	Ark.	22.5
20	S.D.	22
20	Del.	22
21	Ill.	21.5
22	N.M.	21
22	Mass.	21
23	W.Va.	20.5
23	Colo.	20.5
24	La.	20
24	Tex.	20
<b>25</b>	<b>Ala.</b>	<b>19</b>
26	N.H.	18
26	Miss.	18
27	Fla.	17.9
28	Va.	17.5
29	Tenn.	17
29	Mo.	17
29	Hawaii	17
30	S.C.	16
30	Ind.	16
31	Mich.	15
32	N.J.	13.5
33	Calif.	13
33	Okla.	13
33	Wyo.	13
34	Pa.	12
35	N.Y.	8
36	Alaska	8
37	Ga.	7.5

Source: Federation of Tax Administrators, July 2012

## Tax on Hybrid and Electric Vehicles

A significant increase in hybrid and electric vehicles in recent years means that more driving is not being matched by more gasoline sales. In other words, the use of roads by drivers of hybrid and electric vehicles is being subsidized by people driving relatively less fuel efficient cars.

One option to remedy the declining use of gasoline is to put an excise or some other form of tax on sales of hybrid and electric vehicles. In 2011, vehicle sales in Alabama totaled over \$8.9 billion, with hybrid or electric vehicle sales around \$178.5 million (see Table 3-7). A one percent additional sales tax on relatively fuel efficient vehicles (hybrid or electric) would most likely generate \$1.7 million in additional resources. Currently, Alabama's statewide sales tax on motor vehicles is 2.0 percent, so to generate this additional revenue, the sales tax on hybrid/electric vehicles would increase to 3.0 percent. Rising sales of these vehicles going forward will continue to generate additional tax revenues. Another option in this category would be to implement a one-time tax or payment on hybrid and electric vehicles, either at the point of sale or during annual tag renewal or registration.

## General Vehicle Sales Tax Increase

Currently, the sales tax on a vehicle in Alabama is 2.0 percent. In 2011, with sales totaling over \$8.9 billion, motor vehicle sales tax revenues amounted to \$178.5 million. An increase in this sales tax from 2.0 percent to 3.0 percent could have generated \$89.3 million in additional tax receipts. One advantage of such an option is that with the ever-increasing price of vehicles, sales tax revenues on vehicles will be able to help keep up with increasing road use and the rising cost of maintaining roads.

**Table 3-7. Total vehicle sales in Alabama**

Year 2011	Total (Millions)
Total Vehicle Sales	\$8,925
Hybrid/Electric Vehicle Sales Total	> \$178.5
Total Vehicle Sales Tax Collected (2% tax rate)	\$178.5

Source: National Automobile Dealers Association

## Cutbacks in Fuel Tax Exemptions

Eliminating or reducing exemptions allowed on gasoline and diesel sales is another source of additional revenues for ALDOT. This report has not attempted to generate estimates of potential revenue gains from eliminating some or all of the exemptions. However, the list of exemptions is given below.

**Gasoline Tax and Gasoline Portion of the Motor Carrier Fuel Tax Major Exemptions:**

**(1) From the \$.07, the \$.04 and the \$.05 Gasoline Taxes:**

- (a) Agencies of the U.S. Government, supported by Standard Form 1094
- (b) National Guard
- (c) Private and parochial schools and city and county boards of education
- (d) Class I municipalities (Birmingham)
- (e) Class II municipalities (Mobile)
- (f) City and county governments
- (g) Alabama Institute for Deaf and Blind
- (h) Department of Youth Services School District

**(2) From the \$.07 Gasoline Tax:**

- (a) All off-road vehicles currently not requiring state licensing
- (b) Gasoline used for agricultural purposes
- (c) Gasoline used to propel ships, vessels, barges, railroad locomotives and other railroad equipment

**(3) From the Motor Carrier Fuel Tax:**

- (a) Any department, board, bureau, commission or taxing area or other agency of the federal government, of the State of Alabama or any political subdivision thereof
- (b) Any school bus operated by the State of Alabama, any political subdivision thereof, or any private or privately operated school or schools.

**Table 3-8. Refund petitions For gasoline taxes paid**

	<b>Eligible Refund per Gallon</b>
Agricultural	\$0.11
Static Testing	\$0.15
Gas District	\$0.16
Water and Fire Authorities	\$0.16
Fire District	\$0.16
Rescue Squads	\$0.16
Public Parks & Recreation Boards	\$0.16
Mental Health Programs and Facilities	\$0.16
Certain charitable and civic organizations named in Section 40-9-9 through 40-9-13	\$0.16

Source: 2012 Alabama Tax Guide, Executive Budget Office, State of Alabama Department of Finance

**Motor Fuels (Diesel) Tax and Motor Carrier Fuel Tax Major Exemptions:**

**(1) From the \$.13 and the \$.06 Motor Fuels Taxes:**

- (a) Agencies of the U.S. Government, supported by Standard Form 1094
- (b) National Guard
- (c) Motor fuel used in vehicles that are not operated on the public highways of Alabama
- (d) Class I municipalities (Birmingham)
- (e) Class II municipalities (Mobile)
- (f) Private and parochial school systems and city and county boards of education
- (g) Alabama Institute for the Deaf and Blind
- (h) Department of Youth Services School District
- (i) Motor fuel used to propel aircraft

- (j) Motor fuel used for agricultural purposes
- (k) Motor fuel sold to governing bodies of counties or municipalities
- (l) Motor fuel used to propel ships, vessels, barges, railroad locomotives and other railroad equipment
- (m) Kerosene used for lighting and heating
- (n) Dyed motor fuel.

**(2) From the Motor Carrier Fuel Tax:**

- (a) Any department, board, bureau, commission or taxing area or other agency of the federal government, of the State of Alabama or any political subdivision thereof
- (b) Any school bus operated by the State of Alabama, any political subdivision thereof, or any private or privately operated school or schools.

**Table 3-9. Refund petitions for diesel taxes paid**

	<b>Eligible Refund per Gallon</b>
Gas Districts	\$0.19
Water and Fire Authorities	\$0.19
Fire District	\$0.19
Rescue Squads	\$0.19
Public Parks & Recreation Boards	\$0.19
Mental Health Programs and Facilities	\$0.19
Certain charitable and civic organizations Named in Section 40-9-9 through 40-9- 13	\$0.19
Undyed Motor Fuel Used in Off-Road Vehicle or Off-Road Equipment	\$0.19

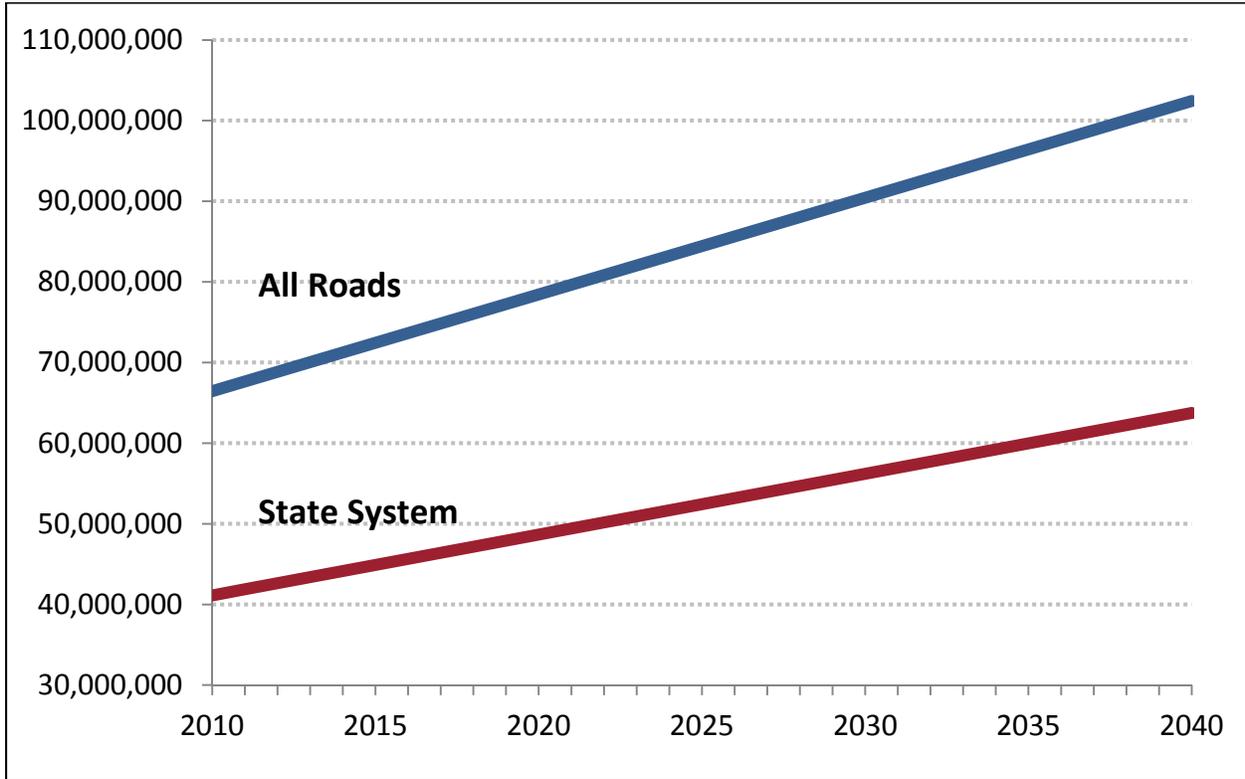
Source: 2012 Alabama Tax Guide, Executive Budget Office, State of Alabama Department of Finance

### **Application of a Road Use Tax**

This scenario is estimated based on the assumption that a road use tax can be applied to the total number of miles driven on Alabama’s roads and highways. The idea is to assess a vehicle miles traveled tax on the state’s drivers based on the number of miles driven in a given year. In concept, this is the fairest and most sustainable option as a replacement for excise taxes. Levying a road use tax is very similar to charging a toll per mile and can be executed at the time when annual vehicle registrations are due. In 2011, a total of around 68 billion miles were driven on Alabama highways, including 42 billion miles on state roads. At approximately one cent per mile, depending on whether it is charged on all roads or only state roads, a road use tax can essentially generate additional revenues of \$68 million to \$42 million annually. These figures would grow if trucks and other heavy vehicles were charged at a higher rate than passenger vehicles. Table 3-10 and Figure 3-11 show how the projected increase in miles driven in the state per year would increase the road tax revenue over time.

Although a viable and tempting alternative, there are a number of problems associated with a road use tax: consumers will be hit by a larger tax once a year instead of paying a much smaller amount when they fill up the gas tank; there is no currently-feasible method to distinguish whether the miles travelled were within or outside the state; and there are problems and costs associated with implementation and collection, including tracking the number of miles traveled. Such a tax also lacks the ability to charge out-of-state drivers, including trucks and other heavy

vehicles, passing through the state. And any implementation of this policy could be severely hindered by protests from both in-state drivers and/or the state's large trucking companies.



**Figure 3-11. Total revenues generated by road use tax** (current dollars)

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

### **Tolling Interstate Roadways**

There are other options the State may wish to explore to generate additional road building revenue. In addition to such items as increases in registration and tag fees, tolling may be a reasonable option. Chapter 5 will present estimates of the revenue that might be generated from tolling Alabama's Interstates.

**Table 3-10. Current and projected vehicle miles traveled in Alabama**

	<b>Total</b>	<b>State System</b>
<b>2010</b>	66,451,800,000	41,121,670,000
<b>2011</b>	67,650,980,000	41,875,760,000
<b>2012</b>	68,850,160,000	42,629,850,000
<b>2013</b>	70,049,330,000	43,383,950,000
<b>2014</b>	71,248,510,000	44,138,040,000
<b>2015</b>	72,447,690,000	44,892,130,000
<b>2016</b>	73,646,860,000	45,646,220,000
<b>2017</b>	74,846,040,000	46,400,310,000
<b>2018</b>	76,045,220,000	47,154,410,000
<b>2019</b>	77,244,400,000	47,908,500,000
<b>2020</b>	78,443,570,000	48,662,590,000
<b>2021</b>	79,642,750,000	49,416,680,000
<b>2022</b>	80,841,930,000	50,170,770,000
<b>2023</b>	82,041,100,000	50,924,870,000
<b>2024</b>	83,240,280,000	51,678,960,000
<b>2025</b>	84,439,460,000	52,433,050,000
<b>2026</b>	85,638,630,000	53,187,140,000
<b>2027</b>	86,837,810,000	53,941,230,000
<b>2028</b>	88,036,990,000	54,695,330,000
<b>2029</b>	89,236,160,000	55,449,420,000
<b>2030</b>	90,435,340,000	56,203,510,000
<b>2031</b>	91,634,520,000	56,957,600,000
<b>2032</b>	92,833,700,000	57,711,690,000
<b>2033</b>	94,032,870,000	58,465,790,000
<b>2034</b>	95,232,050,000	59,219,880,000
<b>2035</b>	96,431,230,000	59,973,970,000
<b>2036</b>	97,630,400,000	60,728,060,000
<b>2037</b>	98,829,580,000	61,482,150,000
<b>2038</b>	100,028,760,000	62,236,250,000
<b>2039</b>	101,227,930,000	62,990,340,000
<b>2040</b>	102,427,110,000	63,744,430,000

Source: Alabama Department of Transportation and The University of Alabama's University Transportation Center for Alabama and Center for Business and Economic Research

## **Chapter 4**

### **Public Survey**

The research team commissioned a survey of Alabama residents to gain insight into the public's desires regarding highway funding in the state. In particular, residents were asked their attitudes about tolling Interstate highways as an alternative revenue stream to fund growing highway construction and maintenance needs in the state.

#### **Performing the Survey**

The Capstone Poll at the University of Alabama performed the survey. The survey was written to take approximately five to 10 minutes to perform and contacted respondents on their land line telephones. The telephone numbers called were randomly selected from throughout Alabama, and 1,011 surveys were successfully conducted from May through July, 2012. Respondents were limited to persons 19 years of age and older.

#### **Questions Asked**

Each respondent was asked a series of questions, though the order of many of the questions was randomized to avoid potential bias. The questions were generated at a meeting held with attendees from the ALDOT Project Advisory Committee and the UA research team. The questions were later modified in consultation with survey experts from the Capstone Poll.

The questions began with introductory and background questions:

- Respondents were asked to report their gender, age, education, race, county of residence, and other personal information. These responses were necessary to adjust the raw responses to reflect the Alabama population. For example, if many more men than women responded to the survey, the results would be adjusted later to reflect Alabama's actual gender distribution.
- Respondents were read a short background concerning Interstate highways, including the agencies that pay for constructing and maintain them. The background described ALDOT's desire to increase funding to maintain high standards of ride quality and safety for Interstate highways and bridges.
- Respondents were asked whether they had completed a trip on an Alabama Interstate highway of 50 miles or longer within the last year. Respondents answering 'yes' were asked how many such trips they had made in the last year. Information from this group was used later in the analysis to generate potential revenues from tolling Interstate highways, because this group represented citizens who would be paying the tolls.

Respondents were also asked similar questions concerning 100-mile trips on Interstate highways they had made in the last year.

Respondents were then asked to describe the maximum tolling fee they would pay for Interstate trips. This question was asked for both 50-mile trips and for 100-mile trips.

Respondents were also asked, “When additional revenue is raised to improve Alabama roads and bridges and reduce congestion, which of the following sources of revenue do you prefer?” The following list of revenue sources were read, and respondents were asked to give their answer on a Likert scale of 1 to 5, where 1 means strongly oppose and 5 means strongly favor:

- “Raising the State gasoline tax of 18 cents per gallon.”
- “Charging tolls on Interstate roads for Interstate trips longer than 25 miles”
- “Charging tolls on Interstate roads for Interstate trips longer than 50 miles”
- “Charging tolls on Interstate roads for Interstate trips longer than 100 miles”
- “Increasing the yearly vehicle registration taxes you pay when renewing your tag”
- “Imposing a tax on hybrids and electric vehicles”
- “Imposing a road use fee based on the number of miles a vehicle is driven per year”
- “Increasing the sales tax to purchase a vehicle to more than 2%”

## **Survey Results**

One set of results describes the potential additional revenue sources the residents of Alabama prefer when additional revenue is raised. The data is presented in Table 4-1. None of the choices scored more than 50% of respondents either “favoring” or “strongly favoring” their use. This result was expected, as few persons tend to favor levying new taxes on themselves. However, when the “% Opposed or Strongly Opposed” and “% Support or Strongly Support” columns are examined, several conclusions can be reached for this sample of Alabama citizens:

- They are most opposed to raising the gasoline tax (83.3% oppose or strongly oppose)
- They show low support for a road use fee (67.7% opposed or strongly opposed)
- They show high support for taxing citizens other than themselves; they would raise taxes on the small percentages of Alabama citizens who own hybrids and electric vehicles (29.4% support or strongly support)
- They generally support taxing long Interstate trips (37.4% and 28.0% for 100-mile trips and 50-mile trips, respectively)

## ***Potential Revenue from Interstate Tolling***

The survey data was also used to make a rough estimate of annual revenue that might be received from tolling Interstate highways. First, data from the group who identified themselves as taking at least one Interstate highway trip of 50 miles or greater in the past year was identified:

- Median number of greater than 50 mile Interstate trips per year
- Mean number of greater than 50 mile Interstate trips per year

- Median of the group’s “willingness to pay” (WTP) for a 50-mile trip. Responses for WTP were widely divergent, with responses ranging from \$0 to \$10.

**Table 4-1. Public preference for additional revenue sources**

	<b>Number Oppose or Strongly Oppose</b>	<b>% Oppose or Strongly Oppose</b>	<b>Number Support or Strongly Support</b>	<b>% Support or Strongly Support</b>
Raise gas tax	822	83.3	94	9.3
Toll Interstate trips: 25 miles	669	66.2	164	16.2
Toll Interstate trips: 50 miles	294	46.7	176	28.0
Toll Interstate trips: 100 miles	262	41.6	235	37.4
Increase registration tax	630	62.3	163	16.1
Tax hybrids & electric vehicles	481	47.7	295	29.2
Road use fee	684	67.7	149	14.8
Increase auto sales tax	614	60.7	215	21.3

That data and the calculation of potential annual tolling revenue are shown in Table 4-2. The calculation was performed three times: The “Un-weighted” row represents the raw data received from the survey. However, to make the data more representative of the entire population of Alabama, the second row of data “Weighted” the data using gender, age, education, and race. The third row of data used the weighting of the second row and added an extra weighting for the county of residence of the respondent. The county factor acts as a proxy for the distance from an Interstate highway to the respondent’s residence (persons far from Interstate highways may use them less frequently), but it ended up making a relatively small impact on revenue.

The bottom two rows in Table 4-2 deserve most attention, as they better represent Alabama’s population than does the information in the top data row. One effect of the weighting was to increase the median WTP, and the increased value significantly increased the potential revenue. The bottom two rows give a rough indication that Alabama could generate \$300 million to \$325 million per year resulting from Interstate highway tolling. The values represent revenue, not net revenue. That is, the values have not been reduced by equipment costs, transaction costs, etc.

**Table 4-2. Estimate of Interstate Tolling Revenue**

	Mean number of trips > 50 miles	Total trips: Mean trips x Population $\geq 19$	Median WTP	Revenue: Median WTP x Total Trips
Un-weighted	122	366,422,868	\$0.50	\$183,211,434
Weighted	142	432,616,636	\$0.75	\$324,462,477
Weighted + Co.	135	409,841,412	\$0.75	\$307,381,059

## Chapter 5

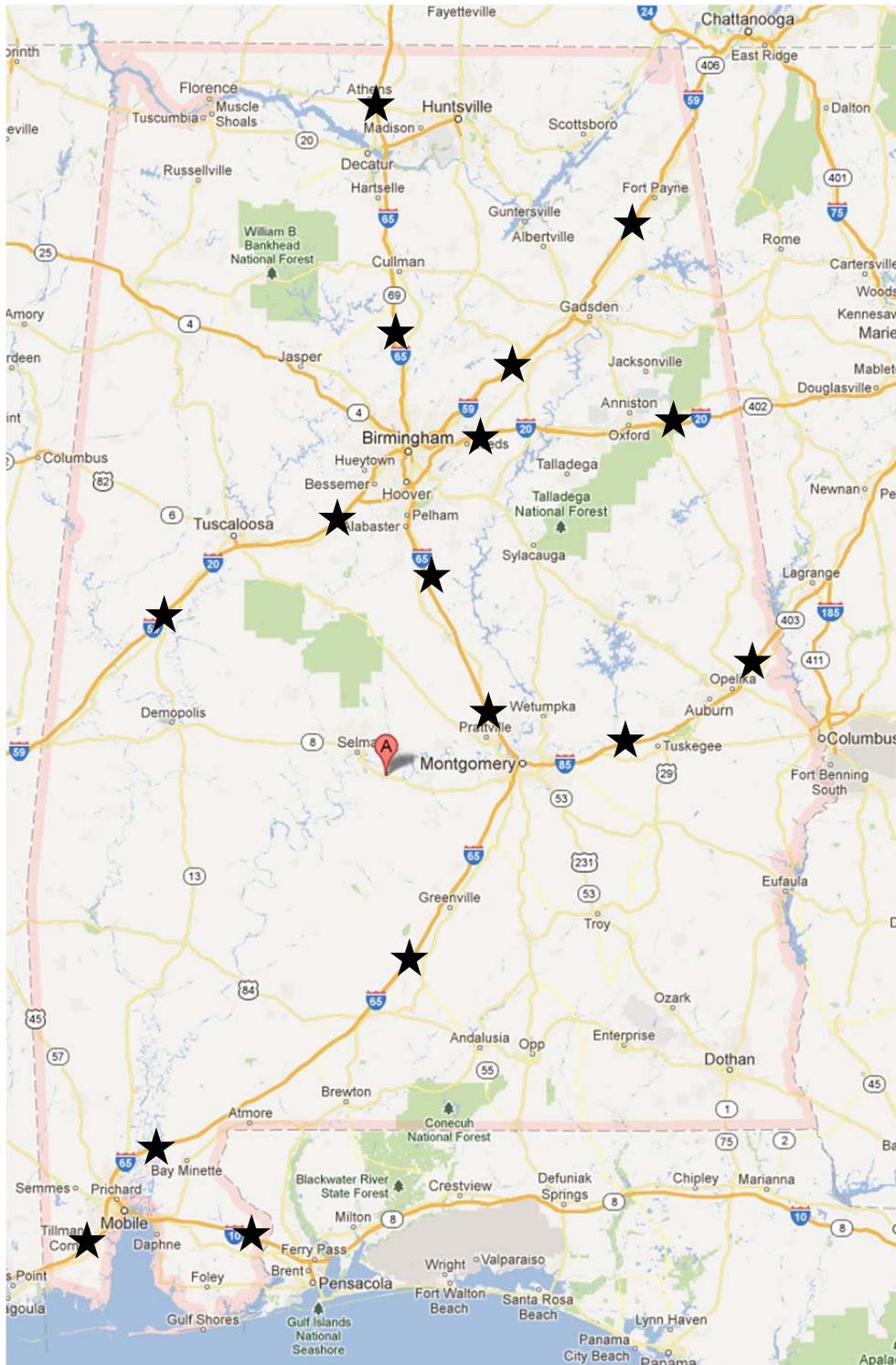
### Estimating Toll Revenue

Researchers met with the ALDOT Project Advisory Committee to devise a potential tolling methodology for Alabama interstates. Based on ALDOT preferences and information gained during the search for background information, the group specified a system designed to target drivers crossing the state and drivers taking long trips in rural areas. Trips inside urban areas are not tolled, nor are short rural trips that do not pass through a tolling point. The tolling system exhibits the following characteristics:

- Open-road tolling (i.e. no toll booths)
- Open tolling scheme (vehicles are charged each time they pass a tolling point)
- Static pricing (prices do not vary during the day)
- Sixteen tolling sites (see Table 5-1 and Figure 5-1), but at each site, only one traffic direction is tolled. For example, at I-10 on the west edge of Alabama, only vehicles traveling east, into the state, are tolled. On I-65 north of Mobile, only vehicles heading north toward Montgomery are tolled; travelers going south into the urban area of Mobile are not tolled.

**Table 5-1. Characteristics of the 16 proposed tolling locations**

Interstate	Location	Length	Tolled Direction
I-10	W state edge	40	EB
I-10	E state edge	40	WB
I-65	N of Mobile	167	NB
I-65	S of Montgomery	167	SB
I-85	E of Montgomery	55	EB
I-65	N of Montgomery	92	NB
I-85	E state edge	27	WB
I-20	W state edge	74	EB
I-20	W of Birmingham	29	WB
I-59	NE of Birmingham	30	NB
I-20	E of Birmingham	77	EB
I-65	S of Birmingham	92	SB
I-20	E state edge	77	WB
I-59	E state edge	52	WB
I-65	N of Birmingham	70	NB
I-65	N state edge	70	SB



**Figure 5-1. A map of proposed tolling locations**

This toll system is relatively cheap to implement and operate because there are no tolling booths, which require large capital investments—they require land and construction, and about four booths are needed for every lane of traffic (Samuel 2012)—and big expenditures on salaries and

benefits for the employees. It is also low cost in terms of air pollution, road wear, and vehicular accidents.

This toll system is simple to build and operate because the toll equipment only needs to identify each vehicle once, rather than twice, at ingress and egress, as in a closed system. A system that requires multiple transactions is more complicated, expensive, and prone to error.

Static pricing receives more support than dynamic pricing in opinion polls (Podgorski and Kockelman 2006), and because it is easy to understand, it is best suited for areas where the people have less experience with toll roads (Zmud and Arce 2008), such as Alabama (Zmud 2008). The plan also follows the suggestions of the Florida DOT—“The simpler the concept, the better” (Dailer and Hevia-Moren 2011b)—and Small and Gomez-Ibanez (1994, cited in Ungemah and Collier 2007)—“Be fairly simple in design.... Build incrementally on previous arrangements or experience.” ATRBTA can add dynamic pricing once drivers get used to toll roads.

### **The Model Inputs**

The authors of this report conferred with several groups to obtain background information and inputs for our calculations. Much of the most useful information came from the following groups:

- Florida DOT (Mr. Tim Garrett)
- North Carolina DOT (Mr. Barry Mickle)
- Delaware DOT (Mr. Vic Buono)
- *Toll Roads News* (Mr. Peter Samuel)
- Gresham Smith (Mr. Rodney Chester and Mr. Marshall Elizer)
- Raytheon (Mr. Brian Patno)
- Federal Signal Technologies (Mr. Jon Ramirez)
- Texas Transportation Institute, Texas A&M University (Mr. Curtis Beaty)

The sources were almost unanimous in stating that the Alabama system layout is atypical. In most tolling installations, travelers are tolled as they drive into a city; tolls target commuters who drive that route frequently. Those frequent commuters will probably drive vehicles equipped with a transponder, making tolling transactions routine and cheap. By contrast, the Alabama plan avoids tolling drivers approaching urban areas; instead, the plan targets drivers making long, rural trips. Those drivers may take those trips less frequently than commuters, and consequently a lower percentage of the drivers may use transponders. Because the system is atypical, the groups consulted by the researchers feel that the Alabama tolling system will make it difficult to accurately estimate model inputs such as the percentage of in-state drivers using transponders.

However, the sources were helpful in providing rough estimates to use in revenue projections. Such items as gantry cost, percentage of trucks licensed in-state, and percentage of passenger cars equipped with transponders were among the variables of interest.

There is significant uncertainty in some of the assumptions for this study. To capture this uncertainty, the researchers used three values for each variable: *most conservative*, *most likely*, and *least conservative*. For example, there was no data on the proportion of passenger cars on Alabama interstates that is registered in state (and therefore no data concerning the proportion that is registered out of state). This proportion affects the revenue estimate because it is easier to collect tolls from in-state vehicles. To include uncertainty, the percentage of in-state passenger cars was treated in the following way:

- Most conservative: 70%
- Most likely: 80%
- Least conservative: 90%

The lower the estimate is of the proportion of passenger-car traffic that is registered in Alabama, the more conservative the toll revenue estimate will be. ATRBTA is more likely to collect tolls from vehicles registered in Alabama because Alabama residents have stronger incentive to use transponders and to pay video tolls. Transponders save money for repeat users, which Alabama residents are more likely to be, and the State can enforce collection more easily inside its own borders by withholding vehicle registrations, for example.

Varying the input ranges not only provides a range of likely revenue estimates; it also shows how sensitive the model is to these inputs. If the revenue estimates exhibit a small range across these assumptions, then these models are not sensitive to the uncertainty. A narrow range of estimates is ideal, but a wide range is helpful, too, because it serves to remind the reader of the difficulty in making accurate predictions.

Table 5-3 provides the three levels for the following revenue estimate inputs:

- Transaction cost: 35 cents (Buono 2012).
- Operations and management costs: The cost to maintain the road is equal with and without tolling, so road maintenance is not included as a tolling-system cost. Gantries need to be replaced about every 10 years. The cost of a gantry (\$2 million<sup>4</sup>) is spread across 10 years, for an annual cost of \$200,000. There is an additional \$400,000 to \$1,000,000 in annual fixed costs for the CSC and gantry maintenance.
- Video-tolling cost: Between mailing the bill, paying credit-card fees, and buying vehicle-registration information from DMVs outside Alabama for as much as \$5 each (Ramirez 2012), the costs of video tolling can be significant. These costs are set at \$1 to \$2 for vehicles registered in state and \$3 to \$5 for vehicles registered out of state.
- Video-tolling premium: most toll authorities charge a revenue-neutral video-tolling premium (Beaty 2012). The study assumed video-tolling premiums that cover the cost of

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<sup>4</sup> We have a cost per gantry for 10 existing toll projects, 9 of which come from Dailer and Hevia-Moren (2011a) and 1 of which comes from Delaware (Buono 2012). The average is \$2.1 million dollars, which is close to the \$2 million estimate provided by Patno (2012). We adopt Patno's estimate for this report.

video tolling for each individual or come up a little short: \$1 for in-state vehicles and \$3-\$4 for out-of-state vehicles.

- Proportion of cars registered in Alabama: See the example above.
- Proportion of trucks registered in Alabama: Truck-registration data from the Alabama Department of Revenue (ALDOR 2012) estimated that trucks registered out of state account for 80% of truck traffic in Alabama. Mr. Jay Starling of ALDOR confirmed the reasonableness of this estimate (Starling 2012).
- Transponder saturation, in-state cars: Garrett (2012) believes ATRBTA should provide a toll-booth option until transponder saturation reaches 80%, but Samuel (2012) argues that is not a problem: It is easy to get high transponder saturation, he argues, at least among regular users, by providing the proper incentives.<sup>5</sup> This study used 80% as the least-conservative assumption and 40% as a more conservative option.
- Transponder saturation, out-of-state cars: The researchers do not expect many cars registered out of state to purchase transponders, setting this value at 10%.
- Transponder saturation, in-state trucks: As explained in The Models section later in this chapter, trucks should have transponder saturation rate at least as high as cars. This value varied between 60% and 80%.
- Transponder saturation, out-of-state trucks: Transponder saturation should be lower for out-of-state trucks than in-state trucks but still rather high because many out-of-state trucks return to Alabama regularly. This value varied between 50% and 60%.
- Collection rate, out-of-state cars: Garrett (2012) said ATRBTA will be doing really well to collect half the tolls it is owed by cars registered out of state, and other states collect about 40% of the tolls owed by out-of-state cars, so this upper bound was set at 40%. It is difficult to collect from out-of-state sources, so the lower bound was 10%.
- Collection rate, in-state cars: It is easier to collect video tolls for vehicles registered in state than for vehicles registered out of state, so the collection rate for in-state cars should be higher than for out-of-state cars. This value varied between 70% and 90%.
- Collection rate, in-state trucks: It is easier to collect video tolls for trucks than for cars. (Trucks have more-frequent contact with enforcement agencies. For example, they must register with ADOR.) This value varied between 80% and 95%.
- Collection rate, out-of-state trucks: The collection rate for out-of-state trucks should fall between the collection rate for out-of-state cars and in-state trucks. This value varied between 50% and 80%.

## The Models

The authors estimated annual Interstate tolling revenues using two models. Model 1 is simple, and model 2 is more complex. Model 1 estimates net revenue using annual average daily traffic (AADT), the proportion of annual average daily traffic that trucks comprise (TADT), the passenger-car toll rate, the truck toll rate, operations and management costs, transaction costs,

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<sup>5</sup> Ramirez (2012) agrees with Samuel: video tolling offers drivers without transponders a way to pay the toll, and offering a booth option is expensive. Ramirez further notes that several tolling facilities are getting rid of the cash/credit-card options.

**Table 5-2. The three sets of inputs used to generate revenue estimates**

	<b>Most Conservative</b>	<b>Most Likely</b>	<b>Least Conservative</b>
transaction cost	\$ 0.35	\$ 0.35	\$ 0.35
operations & management cost	\$ 1,200,000	\$ 600,000	\$ 600,000
video-tolling cost (in state)	\$ 2.00	\$ 1.00	\$ 1.00
video-tolling cost (out of state)	\$ 5.00	\$ 3.00	\$ 3.00
video-tolling premium (in state)	\$ 1.00	\$ 1.00	\$ 1.00
video-tolling premium (out of state)	\$ 3.00	\$ 3.00	\$ 4.00
transponder read rate	100%	100%	100%
proportion of cars registered in AL	70%	80%	90%
proportion of trucks registered in AL	80%	80%	80%
transponder saturation, in-state cars	40%	40%	80%
transponder saturation, out-of-state cars	10%	10%	10%
transponder saturation, in-state trucks	60%	70%	80%
transponder saturation, out-of-state trucks	50%	60%	60%
collection rate, in-state cars	70%	80%	90%
collection rate, out-of-state cars	10%	10%	40%
collection rate, in-state trucks	80%	90%	95%
collection rate, out-of-state trucks	50%	70%	80%

and whether passenger cars divert from the toll road. One of the ways in which Model 1 is simple is that it assumes that each vehicle (passenger car or truck) is equipped with a transponder. Another simplification is that it assumes that all passenger vehicles will use the Interstate until the toll price becomes so high that they all divert around the tolling point. Thus, this model was run using various toll prices until the maximum price at which passenger vehicles would still use the road was reached. Then, the revenue total at that maximum price was reported. Details follow for Model 1:

- Model 1 assumes a two-tiered price system, where there is a toll rate for passenger cars and another toll rate for trucks. Having too many tiers leads to confusion.
- The toll rate for trucks typically ranges between 1.6 and 5.6 times passenger-car tolls, with an average of 3.6 (Wilbur Smith 2009; see Chapter 2). This study assumes the truck toll is 3.0 times the passenger-car toll.
- Model 1 multiplies how much time the Interstate saves compared to the fastest alternative route by the USDOT (2011) recommended low value of travel time (VTT) for all purposes of intercity travel (\$15/hour). It is assumed that all passenger cars take the toll road if this value exceeds the toll and all passenger cars divert if it does not. Given that trucks have a higher VTT and a more difficult time diverting, Model 1 assumes they take the toll facility no matter the toll.
- On some segments, the maximum revenue occurs when there are no passenger vehicles on the toll facility. Under the assumptions of the model, passenger car drivers do not save enough time on the toll road to justify paying a high toll, and truck drivers are insensitive to price. To avoid this problem, the researchers constrain the model to choose the maximum toll for each segment at which there is still passenger-car traffic. These

maximum tolls varied from \$1 to \$5 per segment, depending on segment length and the opportunities for easy diversion around the tolling site.

- Operations and management costs include the cost to purchase and operate the gantries, as well as the cost to operate the customer service center (CSC).
- There is a transaction cost for almost every vehicle that passes the gantry. Although technological advances have lowered the cost of conducting each transaction, the cost may still be significant. Our survey of experts offered several estimates of transaction cost: “almost zero” (Ramirez 2012), 8.5 cents (Beatty and Lieu 2012), “less than 10 cents” (Samuel 2012), and 35 cents (Buono 2012). Thirty-five cents was used in Model 1.

Model 2 is a modification of Beatty and Lieu (2012). Like Model 1, Model 2 assumes that the truck toll rate is three times the passenger-car toll rate, that operations and management costs include the gantries and CSC, and that transaction costs are included. But it includes much more information:

- Model 2 uses a four-tiered price system. Trucks pay more than cars, and drivers who are video tolled pay more than drivers using transponders.
- Model 2 assumes passenger cars are tolled at 10 cents a mile, up to \$5, and trucks 30 cents a mile, up to \$15. There are no diversions, which seems reasonable given that the toll rates are below the averages found by Wilbur Smith (2009) of 11 cents a mile and 39 cents a mile respectively, for passenger cars and trucks.
- Video-tolling cost: Video tolling is expensive. Not only does it require equipment that can drive the cost of a tolling project up by millions (Samuel 2012); it also typically requires handling, mailing, and processing paper bills. If the customer pays with a credit card, the toll authority needs to pay a fee, often between 2.5% and 5% (Garrett 2012). If the vehicle is registered out of state, the toll authority may need to purchase the owner’s contact information from another state’s DMV, which can cost up to \$5 (Ramirez 2012). For these reasons, Model 2 accommodates separate video-tolling costs for vehicles registered in state and vehicles registered out of state.
- Video-tolling premium: Most states charge a higher toll or add an extra fee for customers who use the open-road system without a transponder. The video-tolling premium can be an extra source of revenue, but it is usually set to be revenue neutral (Beatty 2012). Model 2 accommodates separate video-tolling premiums for vehicles registered in state and vehicles registered out of state.
- The proportion of trucks using Alabama roads that is registered in state: This value is important because in-state trucks are more likely to have transponders and to pay video tolls than out-of-state trucks.
- The proportion of passenger cars using Alabama roads that is registered in state: This value is important for the same reasons as the proportion of trucks that is registered in state.
- Transponder saturation for passenger cars registered in state: This variable is important because it is easy and inexpensive to collect tolls from vehicles with transponders. Cars registered in Alabama are more likely to use Alabama Interstate regularly than out-of-state cars, so Model 2 expects a higher proportion of them to have transponders than cars registered elsewhere.

- Transponder saturation for trucks registered in state: Trucks are more likely than cars to use the Interstate regularly, and they pay tolls 1.6 to 5.6 times as high as passenger cars (Wilbur Smith 2009; see Chapter 2), so they save more money using transponders. In addition, it is more difficult for trucks to avoid paying the toll because they are more visible and more heavily policed and because the Alabama Department of Revenue can deny them registration if they fail to pay. For these reasons, Model 2 assumes they are more likely to have transponders than cars.
- Transponder saturation for passenger cars registered out of state.
- Transponder saturation for trucks registered out of state. Although trucks registered out of state are not as likely to use transponders as trucks registered in state, they are more likely to use transponders than cars registered out of state. Trucks save more money from transponders than cars do, and it is more difficult for out-of-state trucks to use the toll road without paying because they are more heavily policed and can be punished more easily (e.g. by preventing them from renewing their registration with the Alabama Department of Revenue).
- Video-tolling collection rate for cars registered in state: Law enforcement has more contact with vehicles registered in state than out of state, and there are more ways to punish violators whose vehicles are registered in their own jurisdictions, such as blocking motor-vehicle registration renewal. Model 2 assumes a higher video-tolling collection rate for cars registered in Alabama than for cars registered elsewhere.
- Video-tolling collection rate for trucks registered in state: Trucks are heavily policed. It is difficult for a truck registered in Alabama to continue to operate there without paying a penalty. For these reasons and the reasons given above, Model 2 assumes a higher video-tolling collection rate for trucks registered in state than for trucks registered out of state.
- Video-tolling collection rate for cars registered out of state.
- Video-tolling collection rate for trucks registered out of state. Trucks are heavily policed, and many out-of-state trucks visit Alabama regularly, making police contact likely for toll violators. In addition, out-of-state trucks must register with the Alabama Department of Revenue (e.g. ALDOR 2012), so ATRBTA may be able to block those registrations for toll violators.

Three estimates of Interstate toll revenue were calculated for each model: a most conservative estimate (using all most-conservative estimates), a most likely estimate, and a least conservative estimate. Each estimate is an aggregate of the maximum revenue generated on each of the 16 segments.

The estimates generated for this study are for a mature toll system. Implementing a toll system requires many one-time expenditures that may be millions of dollars each, such as an investment-grade traffic-and-revenue study (Ramirez 2012) and software and equipment purchases for the CSC. Moreover, toll road use is depressed in the first years of operation while drivers become aware and accustomed to the toll (Beaty and Lieu 2012) and decide whether it is a good value (Cambridge Systematics 2006). For these reasons, traffic and revenue studies typically overstate expected revenue in the first five years (Bain and Wilkins 2002, Bain and Polakovic 2005). Estimates produced for this study do not include these one-time purchases, nor do they account for initial lower facility use after a toll has been implemented.

## The Results

Table 5-3 presents net revenue estimates for each of the 16 tolling points using both models. (These results do not add exactly to the aggregate numbers due to rounding.)

One result to note in Table 5-3 for the Model 1 data is that the passenger car toll is the maximum that can be levied while still providing large enough time savings that motorists still choose to use the Interstate. Thus, tolls vary significantly. For Model 2, the tolls are based on a rate of \$0.10 per mile.

Another result to note is that one segment, I-20 east of Birmingham, is not tolled in Model 1. Even with a \$1 toll, passenger cars have alternate routes providing such rapid travel that the time a driver would save by paying the toll is not worth paying the toll. Therefore, Model 1's results are based on tolling 15 segments. Because Model 2 assumes no diversions, its estimates incorporate tolling on all 16 segments.

Table 5-4 presents the aggregate results. The most conservative estimates for the two models are only \$36 million apart, ranging between \$240 million and \$276 million. However, there is a \$141 million difference between their most likely estimates and a \$206 million difference between their least conservative estimates. Here is why.

Model 1 involves a simple analysis that only takes into account the proportion of vehicles that are passenger cars and the proportion that are trucks. It ignores video tolling premiums and costs, the proportion of vehicles registered in state and the proportion registered out of state, transponder saturation rates, and video-toll collection rates. The small difference observed between Model 1 estimates using the most conservative and most likely assumptions is due to operations and management costs, which vary between \$600,000 (most likely) and \$1,200,000 (most conservative) for each segment.

Model 2 shows more difference primarily because of the cost of video tolling, which can be a significant expense. Note that the more drivers a tolling plan attempts to toll, the greater the difference between the most conservative and least conservative estimates. In addition to processing and handling, the toll authority needs to mail bills, pay credit-card fees, and possibly buy vehicle-registration information from other DMVs at up to \$5 each (Ramirez 2012).

Even if the drivers who pay a video toll also pay a premium that covers the added expense of video tolling, video tolling imposes a significant burden on the toll authority's bottom line because the costs associated with video tolling are largely borne just in billing the driver. The authority needs to obtain the driver's vehicle-registration information and mail the bill without knowing whether the driver will ever pay. The most conservative assumptions assume that lower proportions of drivers are in state (who are easier to collect from), lower proportions of drivers have transponders (resulting in more drivers who need video tolling), and lower collection rates than the most likely and least conservative assumptions.

**Table 5-3. Net-revenue estimates by segment (\$millions)**

Interstate	Location	Model 1 Passenger-Car Toll	Model 1			Model 2 Passenger-Car Toll	Model 2		
			Most Conservative	Most Likely	Least Conservative		Most Conservative	Most Likely	Least Conservative
I-10	W state edge	\$1	\$15	\$15	\$15	\$ 4	\$21	\$42	\$53
I-10	E state edge	\$5	\$36	\$36	\$36	\$4	\$9	\$19	\$24
I-65	N of Mobile	\$3	\$20	\$20	\$20	\$5	\$15	\$25	\$30
I-65	S of Montgomery	\$2	\$12	\$12	\$12	\$ 5	\$65	\$23	\$28
I-85	E of Montgomery	\$2	\$18	\$18	\$18	\$5	\$18	\$32	\$40
I-65	N of Montgomery	\$1	\$9	\$9	\$9	\$5	\$21	\$36	\$45
I-85	E state edge	\$1	\$8	\$8	\$8	\$3	\$3	\$14	\$19
I-20	W state edge	\$1	\$7	\$7	\$7	\$5	\$21	\$31	\$36
I-20	W of Birmingham	\$2	\$31	\$31	\$31	\$3	\$10	\$29	\$38
I-59	NE of Birmingham	\$2	\$11	\$11	\$11	\$3	\$4	\$12	\$15
I-20	E of Birmingham	--	--	--	--	\$5	\$28	\$37	\$39
I-65	S of Birmingham	\$2	\$21	\$21	\$21	\$5	\$21	\$37	\$46
I-20	E state edge	\$1	\$9	\$9	\$9	\$5	\$22	\$37	\$45
I-59	E state edge	\$1	\$4	\$4	\$4	\$5	\$12	\$19	\$22
I-65	N of Birmingham	\$ 3	\$32	\$32	\$32	\$5	\$22	\$38	\$47
I-65	N state edge	\$1	\$6	\$6	\$6	\$5	\$17	\$27	\$31

**Table 5-4. Aggregate estimates of annual net revenue (in millions of dollars)**

	most conservative	most likely	least conservative
Model 1	\$ 240	\$ 249	\$ 249
Model 2	\$ 276	\$ 390	\$ 455

Despite the significant costs that video tolling imposes, it is a necessary component of the proposed tolling system. Short of installing expensive toll booths, video tolling premiums are the only feasible incentive drivers have to purchase transponders. Few drivers would purchase transponders in a toll system that had neither booths nor video tolls.

The two models use drastically different assumptions, yet they have similar lower-bound estimates. This result provides confidence that implementing the proposed toll system will generate at least \$240 million in revenue annually for transportation construction, maintenance, and operations costs in Alabama. There is less certainty concerning the most likely toll revenue, because the estimates provided by Model 1 and Model 2 do not match as closely, but those results indicate that annual net revenue in a mature system can be approximately \$250 million to \$390 million.

## **Chapter 6**

### **Conclusions**

This research project examined three aspects of alternative revenue funding sources for ALDOT:

- Public opinion towards various alternative funding options
- Economic studies of various alternatives to estimate their ability to cover potential revenue shortfalls
- An extended study of the feasibility of using tolling of Interstate highways as an alternative revenue source

#### **Survey**

Researchers conducted a telephone survey of 1,011 Alabama residents through the Capstone Poll at the University of Alabama. Respondents were asked which of the following alternative revenue sources they prefer if additional resources were needed to improve Alabama roads and bridges:

- “Raising the State gasoline tax of 18 cents per gallon.”
- “Charging tolls on Interstate roads for Interstate trips longer than 25 miles”
- “Charging tolls on Interstate roads for Interstate trips longer than 50 miles”
- “Charging tolls on Interstate roads for Interstate trips longer than 100 miles”
- “Increasing the yearly vehicle registration taxes you pay when renewing your tag”
- “Imposing a tax on hybrids and electric vehicles”
- “Imposing a road use fee based on the number of miles a vehicle is driven per year”
- “Increasing the sales tax to purchase a vehicle to more than 2%”

Complete results are presented in Chapter 4, but some of the most pertinent results are shown below:

- Respondents are most strongly opposed to raising the gasoline tax (83.3% oppose or strongly oppose)
- Respondents show low support for a road use fee (67.7% opposed or strongly opposed)
- Respondents show high support for taxing citizens other than themselves; they would raise taxes on the small percentages of Alabama citizens who own hybrids and electric vehicles (29.4% support or strongly support)
- Respondents showed highest support for taxing long Interstate trips (37.4% and 28.0% for 100-mile trips and 50-mile trips, respectively)

## **Economic Studies**

Researchers examined seven options for increasing transportation funding revenue in Alabama. The options and estimates for potential annual revenue arising from those options are listed below:

- Indexing based on the Consumer Price Index (CPI). This option generates little revenue in the short and mid-term.
- Indexing based on the Price Index of Construction Cost (Land Transportation). This option generates little revenue in the short and mid-term.
- Implementation of Sales Tax on Gasoline and Diesel Fuel Purchases. A 4% sales tax on these purchases could increase revenue by over \$380 million/year.
- Increase in Excise Tax on Gasoline and Diesel Fuel. Each penny/gallon increase on gasoline raises approximately \$26 million/year.
- Tax on Hybrid and Electric Vehicles. A 1% addition to the current 2% tax would raise approximately \$1.7 million/year.
- General Vehicle Sales Tax Increase. Each percent-point increase above the current 2% tax rate would generate approximately \$89 million/year.
- Application of a Road Use Tax. A road use tax of one cent per mile for driving on Alabama roads and highways would generate \$68 million/year.

## **Tolling Interstate Highways**

The researchers used two modeling techniques to estimate revenues from tolling Alabama Interstates, based on a system of tolling long, rural trips on Interstates and not tolling Interstate highway usage inside urban areas or on short rural trips. Both techniques were evaluated in “most conservative”, “most likely”, and “least conservative” situations, where “most conservative” produced lowest revenue estimates. Results from both models indicate that revenues of at least \$240 million/year could be generated from implementing Interstate highway tolls. “Most likely” scenarios generated values of \$249 million/year and \$390 million/year, while the “least conservative” scenarios resulted in values of \$249 million/year and \$455 million/year.

The estimates generated for this study are for a mature toll system. Implementing a toll system requires many one-time expenditures that may cost millions of dollars each, such as an investment-grade traffic-and-revenue study and software and equipment purchases for the Customer Service Center. Moreover, toll road use is depressed in the first years of operation while drivers become aware and accustomed to the toll and decide whether it is a good value. Estimates produced for this study do not include these one-time purchases, nor do they account for initial lower facility use after a toll has been implemented.

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