

Diversifying Revenues to Improve Commerce and Economic Prosperity



Prepared By:
**Institute for Transportation
Research and Education (ITRE)**
North Carolina State University

Daniel J. Findley, Ph.D., P.E.
Senior Research Associate

Steve Bert, M.P.P.
Research Assistant

Adrienne Heller, M.C.R.P.
Research Assistant

J. Douglas Small
Research Assistant

Wah Tran
Research Assistant

Leigh B. Lane, B.S.C.E.
Senior Research Associate

Prepared For:
North Carolina Chamber Foundation



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Executive Summary

Transportation infrastructure is deeply connected with the economic development of North Carolina. From providing access to jobs, education, and healthcare, to moving the goods and services relied on by North Carolina residents and businesses, a high-functioning transportation system is needed to create opportunities that maintain and expand economic development. Currently, North Carolina's infrastructure funding crisis is challenging the present and long-term efficacy of businesses. By 2040, the state is projected to face a transportation investment deficit ranging from \$34.4 billion to \$94.4 billion.¹ With business-as-usual investment, North Carolina is projected to invest \$59.7 billion in its transportation system; even though North Carolina's transportation system requires an investment of \$94.1 billion to maintain today's travel conditions and \$159.5 billion to reach optimal travel conditions.²

Exhibit 1

Key Benefits of Infrastructure Investment

- Well-designed infrastructure investments have long-term economic benefits and create jobs in the short run
- Middle-class Americans would benefit disproportionately from this investment through both the creation of middle-class jobs and by lowering transportation costs for American households
- There is strong demand by the public and businesses for additional transportation infrastructure capacity.

Source: U.S. Council of Economic Advisors

These deficits are largely due to declining motor fuels tax receipts. The motor fuels tax, which has been the primary funding mechanism for North Carolina's surface transportation system since 1921, is becoming increasingly unreliable. Vehicle fuel economy improvements and losses in the motor fuels tax's purchasing power (the federal motor fuels tax has not been adjusted for inflation since 1993) have led to statewide transportation system deterioration. Thirty percent of the state's bridges are structurally deficient or functionally obsolete, which ranks North Carolina 37th out of 52 inventoried state transportation agencies (includes Washington D.C. and Puerto Rico).³ Meanwhile statewide congestion costs are climbing. North Carolina residents spend more than \$2 billion annually on additional fuel and travel time that results from congestion.⁴

Investment in transportation infrastructure provides substantial economic benefits for the state of North Carolina (see Exhibit 1).⁵ In addition to improving travel conditions, North Carolina

¹ "From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf.

² Ibid

³ "Deficient Bridges by State and Highway System," 2012, <http://www.fhwa.dot.gov/bridge/nbi/no10/defbr12.cfm>

⁴ TRIP, "North Carolina Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility," March 2014, http://www.tripnet.org/docs/NC_Transportation_by_the_Numbers_TRIP_Report_March_2014.pdf

⁵ U.S. Council of Economic Advisors, "A New Economic Analysis of Infrastructure Investment," March 23, 2012.

transportation investment has the potential to create jobs, increase wages, and grow North Carolina's gross state product. For example, every \$1 billion of transportation investment in North Carolina generates 14,300 jobs, \$10.3 billion in wages, and \$10.8 billion in gross state product.⁶ Exhibit 2 demonstrates the economic benefits of transportation investment in jobs, output (gross state product), and employee compensation with its transportation system meeting various levels of service. Currently, North Carolina is investing at an annual Level of Service D.⁷

Exhibit 2
Total Impacts of Infrastructure Spending (Construction and Long-Term)

Level of Service (LOS)	D (Current)	C	B	A
Level of Investment	\$3.5 billion	\$5.7 billion	\$7.0 billion	\$10.0 billion
Jobs	50,050	81,510	100,100	143,000
Employee Compensation	\$36.15 billion	\$58.87 billion	\$72.30 billion	\$103.28 billion
Output	\$38.06 billion	\$61.98 billion	\$76.11 billion	\$108.73 billion

Sources: NCDOT 2040 Plan and IMPLAN modeling Software

The North Carolina Department of Transportation is in a unique position where it owns and operates 79.4 percent of its total lane miles.⁸ By comparison, only four other state departments of transportation own and operate a higher percentage of lane miles.⁹ This puts NC in a unique situation which requires the State to act to ensure that our infrastructure will support sustained economic growth.

Nationwide, drivers spend \$6,000 to \$10,000 annually for owning and operating a vehicle (dependent on vehicle type).¹⁰ Of that expenditure, \$640 is spent on fees that support the state's surface transportation system. This report focuses on those fees. As North Carolina confronts increasing transportation budget deficits, reliable revenue generating mechanisms will become invaluable to preserve the state's transportation infrastructure. Sixteen revenue generating options are evaluated in this report on the basis of six criteria. A snapshot of their performance based on these criteria (organized by yield potential) is shown in Exhibit 3. A more in-depth discussion of these revenue options can be found in section 3 of the report.

⁶ IMPLAN modeling software was used to obtain these values.

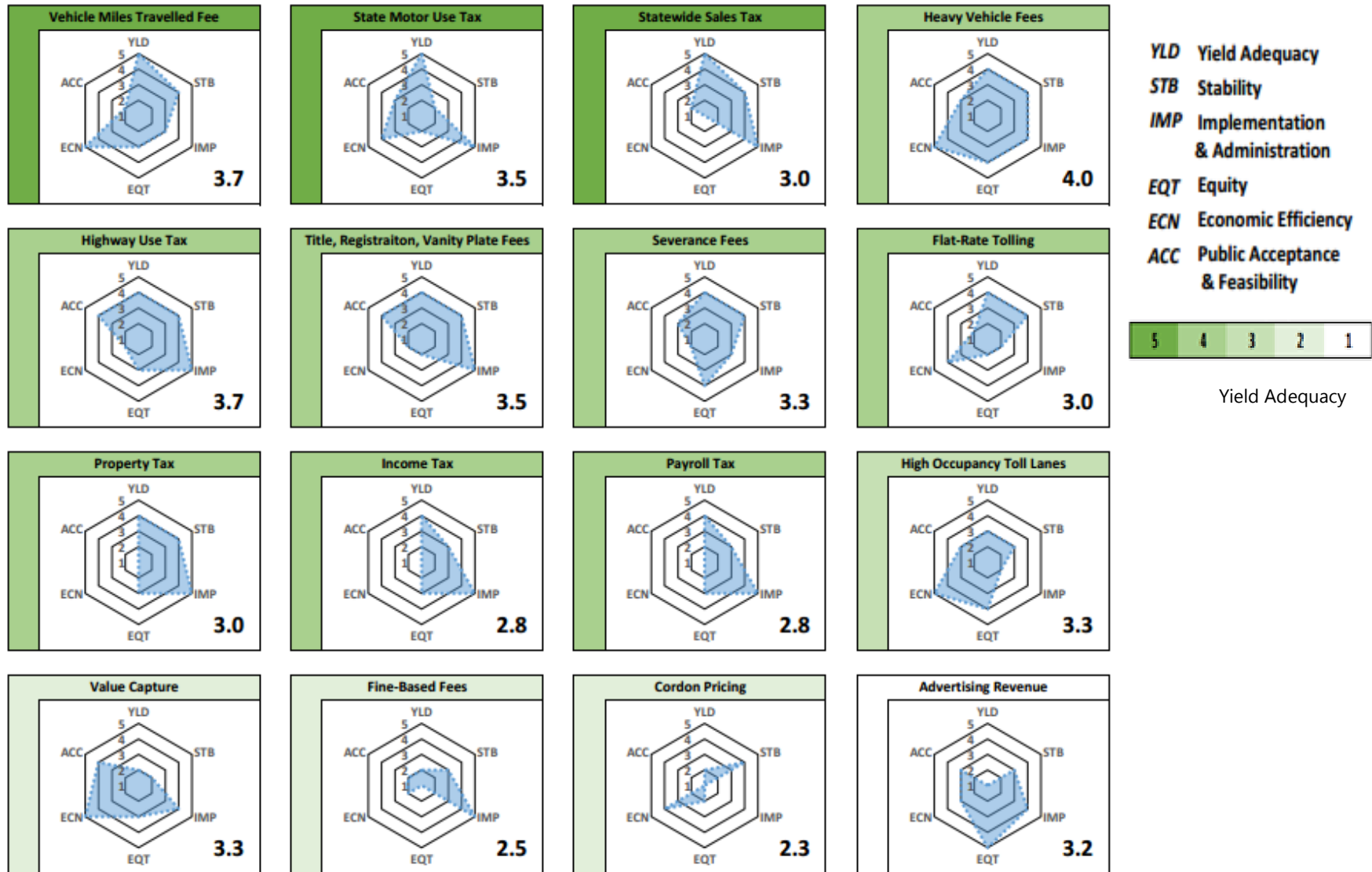
⁷ "From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf.

⁸ Federal Highway Administration, "State Highway Agency – Owned Public Roads" October 2012. <https://www.fhwa.dot.gov/ohim/hs00/hm81r.htm>

⁹ Ibid

¹⁰ AAA, "Owning and Operating Your Vehicle Just Got a Little Cheaper," May 9, 2014. <http://newsroom.aaa.com/2014/05/owning-and-operating-your-vehicle-just-got-a-little-cheaper-aaas-2014-your-driving-costs-study/>

Exhibit 3
Revenue Options by Yield Adequacy and Overall Rank



Source: Institute for Transportation Research and Education

1.0 Historical Context

From the 500 miles of plank roads laid in North Carolina in the 1850s¹¹, to the over 168,000 state maintained lane miles today¹², roads have been built to connect communities, facilitate trade, and enable travel to school, work, health services, and a multitude of other destinations. As North Carolina transitioned from a limited number of wooden toll roads to a paved network of local roads, collector routes, and arterials, a sustainable method of funding this infrastructure has been essential. In 1921, North Carolina first imposed a gasoline tax of 1 cent per gallon on all motor fuels sold or distributed in the state.¹³ Since its inception, the motor fuels tax has served as a viable funding source to support highway construction, maintenance, public transportation, rail programs the State Highway Patrol, and the Division of Motor Vehicles.¹⁴ State and federal motor fuels taxes, motor vehicle registration fees, title fees, the highway use tax, tolls, local property taxes, and other fees sustain North Carolina's transportation system. Motor fuels taxes (both state and federal) have been, and continue to be the state's predominant transportation funding source, accounting for nearly two-thirds of total funding.¹⁵ Within the last two decades, however, revenues generated from motor fuels taxes have declined dramatically.

Similar to the majority of other states, North Carolina is now in the midst of a funding crisis. North Carolina's transportation revenues can no longer sustain its system needs. By 2040, the state will require \$94.1 billion to simply maintain transportation system conditions as they are today;¹⁶ however, North Carolina is projected to collect only \$59.7 billion of transportation revenue. Moreover, to achieve optimal transportation system conditions, North Carolina would need \$159.5 billion in revenue.¹⁷

Industry research demonstrates that the state's transportation system is on track to become highly expensive, uncompetitive, and unsafe.¹⁸ These conditions are likely to result from the onset of significant population growth, increased system demands, and decreased transportation revenue, among other factors. Without increased levels of investment, North Carolina's transportation

¹¹ Troy L. Kickler. "North Carolina History Project: Plank Roads," 2014, John Lock Foundation, <http://www.northcarolinahistory.org/commentary/69/entry>

¹² FHWA, "Relationships Between Asset Management and Travel Demand," 2012. <http://www.fhwa.dot.gov/infrastructure/asstmgmt/vmt03.cfm>

¹³ North Carolina Department of Revenue, "Motor Fuels Tax Rates," <http://www.dornr.com/taxes/motor/rates.html>

¹⁴ "From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf

¹⁵ NCDOT, "2013-14 NCDOT Sources and Uses Chart," <http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>

¹⁶ "From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf

¹⁷ Ibid

¹⁸ "Smart Transportation North Carolina: Save Money and Grow the Economy," 2011, Smart Growth America, <http://www.smartgrowthamerica.org/documents/smart-transportation-north-carolina.pdf>

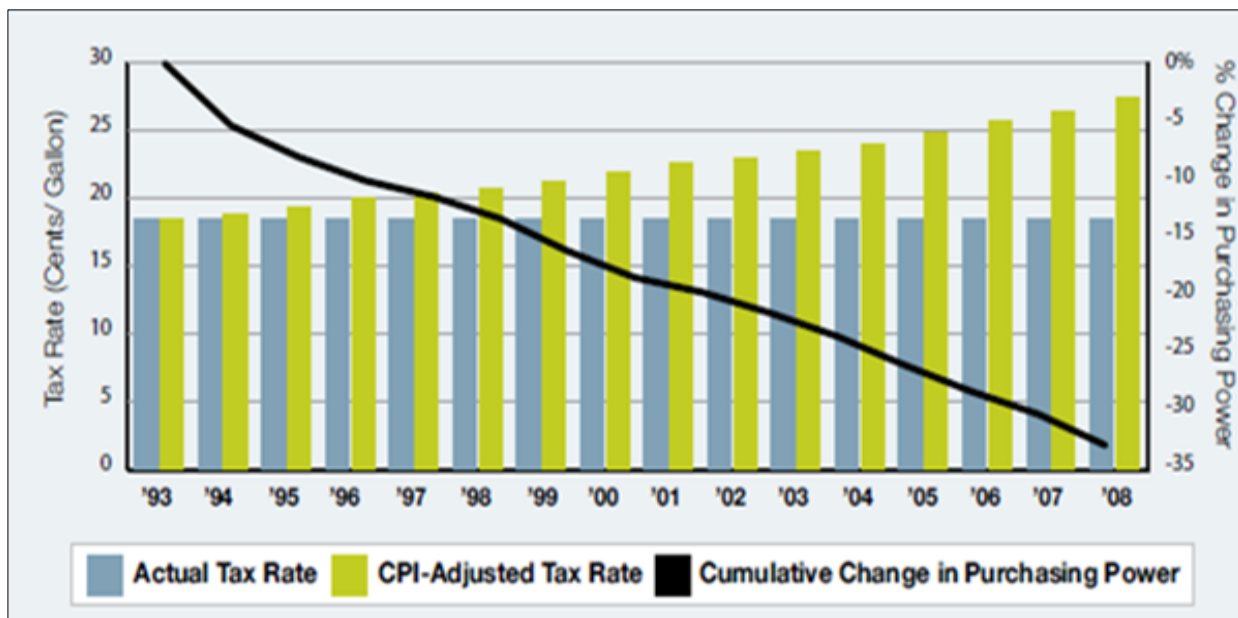
funding shortfalls are projected to reach up to \$94.4 billion by 2040.¹⁹ Meanwhile, Congress and the President continue to delay making long-term meaningful decisions about investing in the nation's infrastructure,²⁰ which is negatively impacting North Carolina's transportation system.

A converging set of factors is challenging the state's ability to meet its transportation system maintenance and improvement requirements. These factors include the erosion of motor fuels tax receipts, system-wide effects of enhanced vehicle fuel economies, the rise of construction costs, the rise of maintenance costs and, above all, North Carolina's rapidly increasing population.

1.1 Erosion of the Motor Fuels Tax

The Federal motor fuels tax has not been increased in 20 years, which has effectively lowered its cumulative purchasing power by over 33 percent (Exhibit 4).²¹ The erosion of federal tax receipts severely impacts North Carolina's transportation system, as federal funds accounted for 27.2

Exhibit 4
Federal Gasoline Tax Rate and Loss in Purchasing Power



Source: Atkinson et. al, 2009, "Paying Our Way", National Surface Transportation Infrastructure Financing Commission

¹⁹ "From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf.

²⁰ Alliance for American Manufacturing, "Infrastructure Investment Creates American Jobs," October 2014, https://s.bsd.net/aamweb/main/page/file/9d937012edb12326c4_7vm62z7l5.pdf

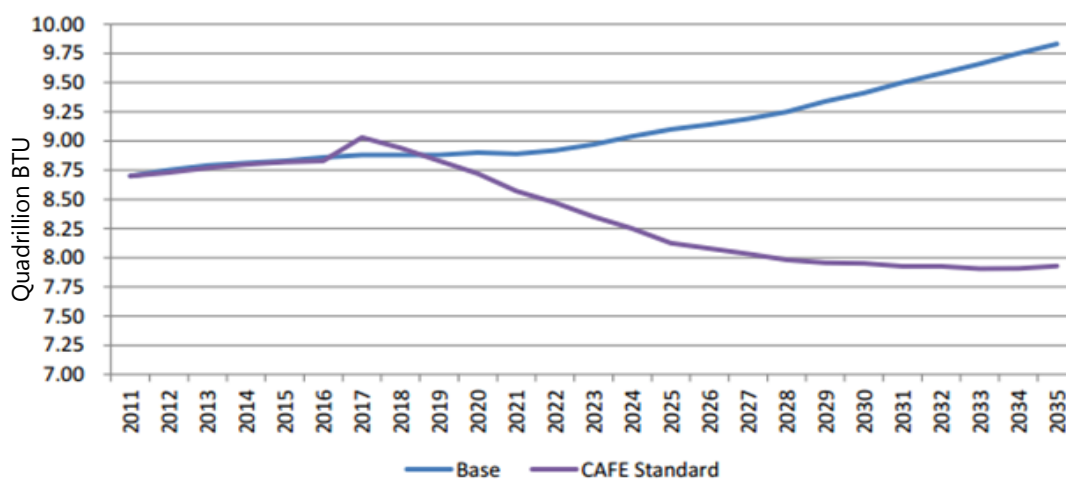
²¹ Atkinson et. al, 2009, "Paying Our Way", National Surface Transportation Infrastructure Financing Commission, http://financecommission.dot.gov/Documents/NSTIF_Commission_Final_Report_Advance%20Copy_Feb09.pdf

percent (\$1.2 billion) of the state's total funds fiscal year 2013-14.²² While North Carolina is one of twelve states to have successfully implemented an indexed tax rate, this tax rate has undergone different caps since 2007 that have led to a cumulative loss of \$559 million in revenue.²³

1.2 System-wide Effects of Improved Fuel Economies

Fuel tax receipts have also declined as a result of fuel efficiency improvements in vehicles. Efficiency improvements have allowed vehicles to travel farther on a gallon of gasoline, resulting in a decreased demand for gasoline, lower fuel usage per mile, and lower fuel tax receipts. Since 1980, vehicle miles traveled have doubled while fuel consumption has increased by only 50 percent.²⁴ Efficiency gains are projected to acutely affect North Carolina by 2018,²⁵ coinciding with the impact of the federal fuel efficiency standards. Fuel consumption patterns are projected to shift so that fuel consumption will fall to 96 percent and 81 percent of current fuel levels by 2020 and 2035, respectively.²⁶

Exhibit 5
Projected Light Duty Fuel Consumption
(Quadrillion BTU per Year)



Source: "NCDOT From Policy to Projects 2040 Plan: Financial Plan and Investment Strategies," 2012, NCDOT

²² "NCDOT Sources of Funds 2013-14 by Major Funding Source," NCDOT, <http://www.ncdot.gov/download/about/finance/2014SourcesofFundspiechart.pdf>

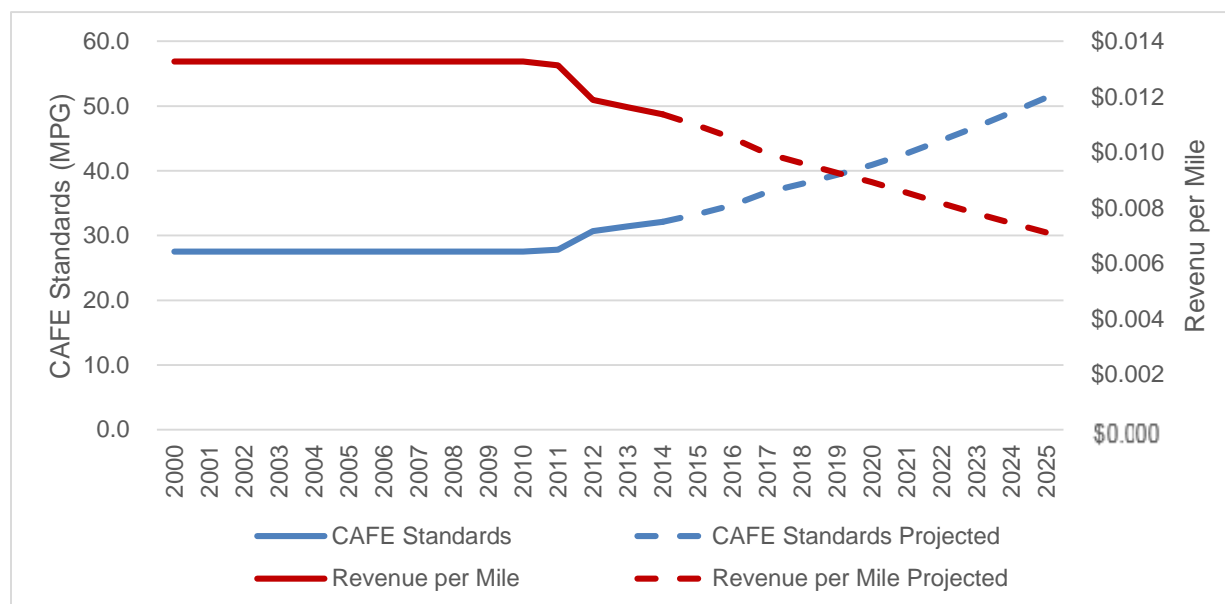
²³ 2013 "Historical Information: NC Motor Fuels Tax."

²⁴ Sorenson et. al, 2009, "Implementation Strategies for Shifting to Direct Usage-Based Charges for Transportation Funding," NCFRP, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w143.pdf

²⁵ "NCDOT From Policy to Projects 2040 Plan: Financial Plan and Investment Strategies," 2012, NC Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf

²⁶ "From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf

Exhibit 6
Revenue based on Vehicle Fuel Economy



Source: Derived from Environmental Protection Agency, October 2012.

In recent years, substantial changes were mandated to improve the Corporate Average Fuel Economy (CAFE) standards of vehicles in the United States. The minimum CAFE standard for domestically manufactured passenger cars will increase from 27.5 miles per gallon (mpg) to 51.3 mpg over the period of 2010-2025.²⁷ Though these changes offer environmental and political benefits in the form of reduced auto emissions and greater American fuel independence, they negatively impact transportation revenue obtained through motor fuel tax receipts. Exhibit 6 demonstrates how fuel economy improvements impact North Carolina's transportation revenues. Using North Carolina's current motor fuels tax rate of \$0.365 per gallon,²⁸ it can be determined that a light duty vehicle meeting CAFE standards of 27.5 mpg (2010 requirement) generates 1.3 cents per mile in transportation revenue while a vehicle operating at 40.9 mpg (2020 requirement) generates 0.9 cents per mile. These light duty vehicles are likely to have similar weights and thus impose similar damage on the roadways; however, the less efficient vehicle generates more transportation revenue.

²⁷ Environmental Protection Agency, "Table I-3-Minimum Standard for Domestically Manufactured Passenger Cars (MPG)," October, 2012. <http://www.nhtsa.gov/fuel-economy> (see: "DOT and EPA Establish CAFE and GHG Emissions Standards for Model Years 2017 and Beyond: Final Rule (Federal Register version)")

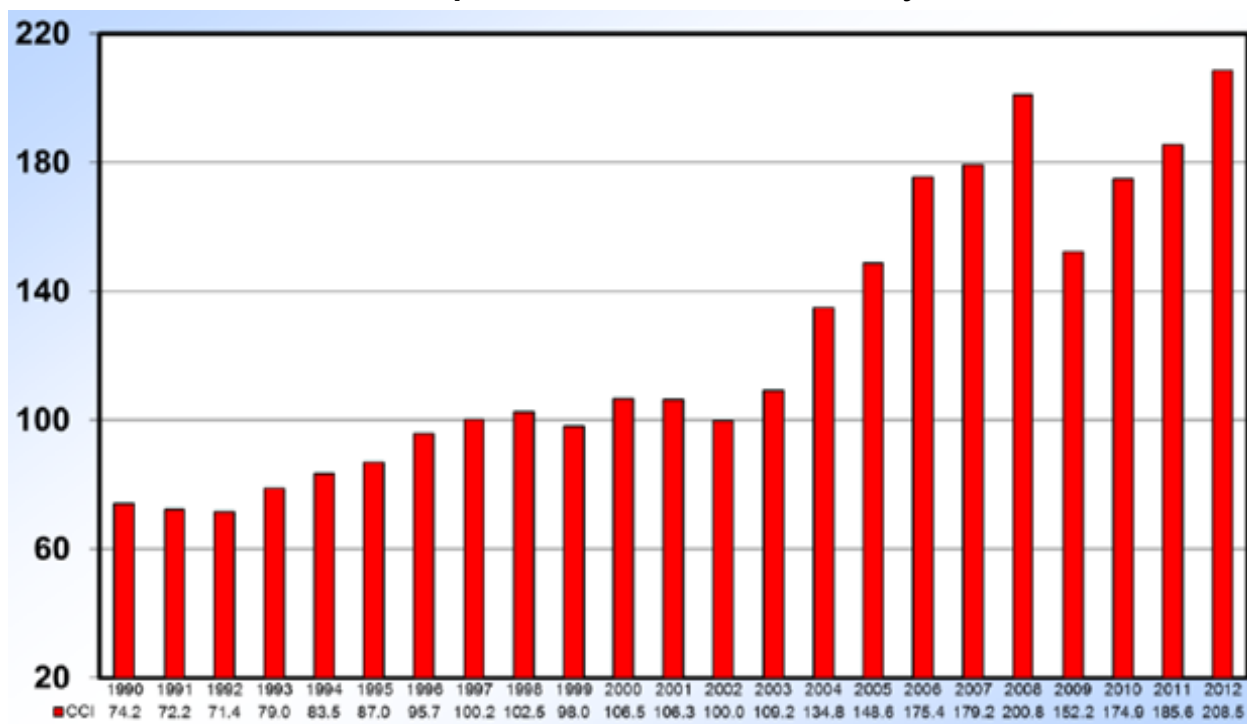
²⁸ North Carolina Department of Revenue, "Motor Fuels Tax Rates," June 18, 2014. <http://www.dor.state.nc.us/taxes/motor/rates.html>

1.3 Construction Costs on the Rise

While motor fuels tax revenues are declining, construction costs are on the rise. This is because the price of crude oil is directly linked to the price of construction inputs, such as asphalt. Crude oil has increased at a compound annual growth rate of 38 percent since 2001.²⁹ As oil prices have risen, so has the cost of highway construction. The same construction project executed in 2001 costs 50 percent more today.³⁰

Exhibit 7

NCDOT Annual Composite Construction Cost Index by Calendar Year



Source: NCDOT, "Annual Highway Composite Construction Cost," 2013

1.4 Maintenance Issues on the Rise

North Carolina's surface transportation system's maintenance needs are not being met with adequate investment. Thirty percent, or 5,488, of the state's 18,165 bridges are structurally deficient or functionally obsolete.³¹ North Carolina falls behind the national average of 25 percent

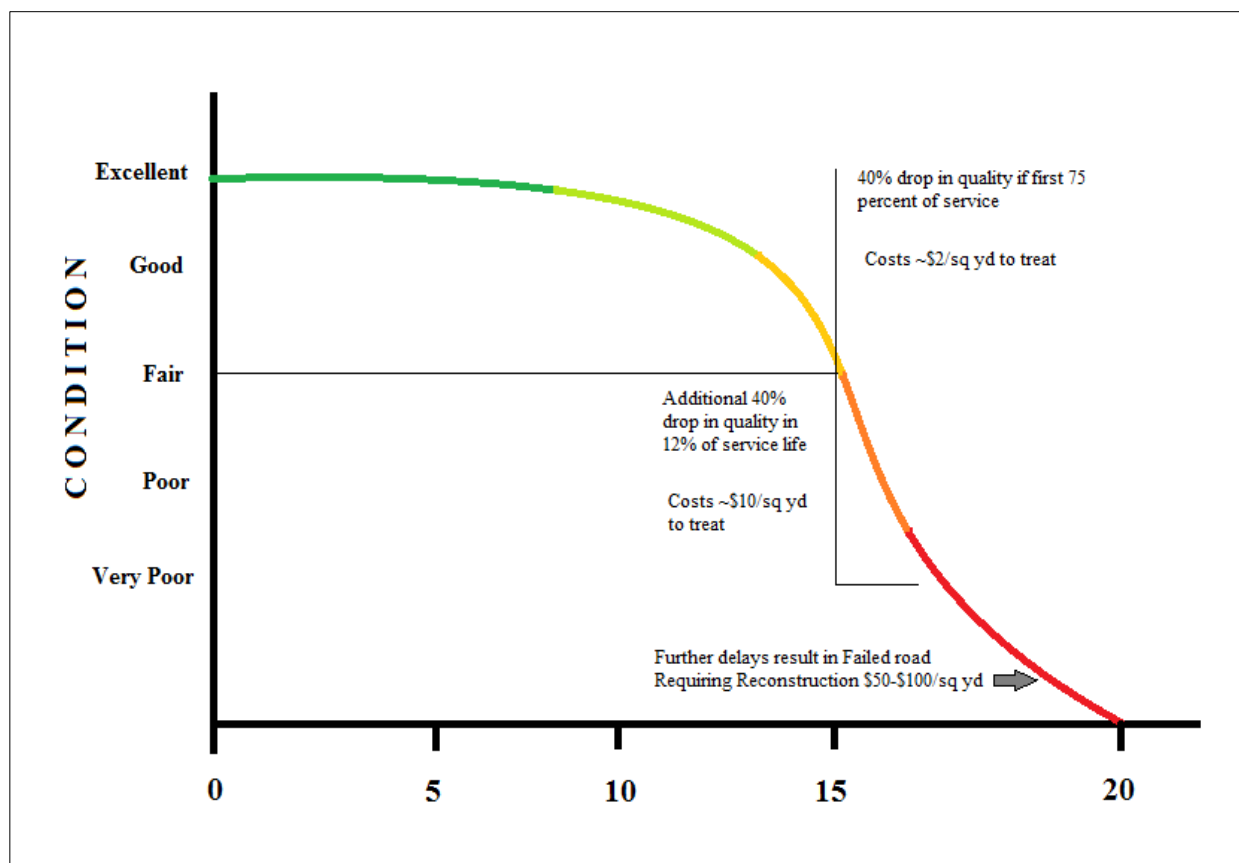
²⁹ A compound annual growth rates was calculated from the following source: "Historical Crude Oil Prices Table," March 6, 2014, http://inflationdata.com/Inflation/Inflation_Rate/Historical_Oil_Prices_Table.asp.

³⁰ Tom Nicholson, March 26, 2012, "Higher Oil Prices Push Asphalt Up 11.2% from a Year Ago," Engineering News Record, http://enr.construction.com/economics/quarterly_cost_reports/2012/0326-65279higher-oil-prices-hit-asphalt.asp

³¹ "Deficient Bridges by State and Highway System," 2012, <http://www.fhwa.dot.gov/bridge/nbi/no10/defbr12.cfm>

Exhibit 8

Pavement Life Cycle Costs



Source: "What is Pavement Management?" Capitol Asset & Pavement Services, Inc

(for structurally deficient and/or functionally obsolete bridges) and is ranked 37th out of 52 inventoried state transportation agencies (including Washington D.C. and Puerto Rico).³² The state's roads are also in need of repair. Forty-four percent of North Carolina's major urban roads are in poor or mediocre condition.³³ Moreover, proactive transportation system maintenance is crucial for reducing the overall costs required to sustain a transportation system. For example, according to the American Association of State Highway and Transportation Officials (AASHTO), every \$1 spent to keep a road in good condition avoids \$6-14 needed later to rebuild the same road once it has deteriorated.³⁴

³² "Deficient Bridges by State and Highway System," 2012, <http://www.fhwa.dot.gov/bridge/nbi/no10/defbr12.cfm>

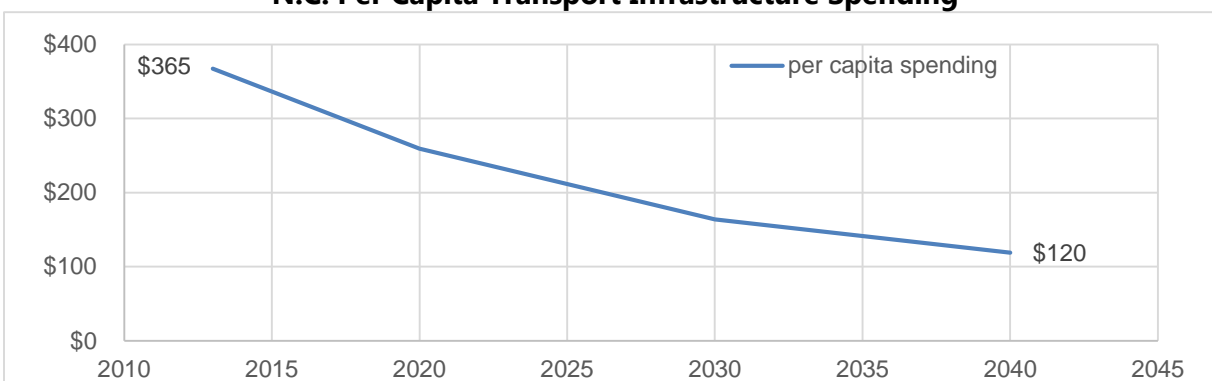
³³ Jim Jennings, October 23, 2012. "New Data Shows Poor Road Conditions Hinder Economic Growth in North Carolina."

³⁴ "Smart Transportation North Carolina: Save Money and Grow the Economy," 2011, Smart Growth America, <http://www.smartgrowthamerica.org/documents/smart-transportation-north-carolina.pdf>

1.5 Per Capita Investment Decrease

North Carolina's transportation funding crisis is exacerbated by population growth. Currently, 9.8 million people live in North Carolina, and this number is expected to grow to 13.5 million by 2040,³⁵ which is the equivalent of adding the entire population of South Carolina. A per capita estimate shows that North Carolina will spend approximately \$365 per resident on its transportation system this year, and in 2040, the state is projected to spend only \$120 per resident, if the state's funding levels were to remain the same (see Exhibit 9).

Exhibit 9
N.C. Per Capita Transport Infrastructure Spending



Source: Institute for Transportation Research and Education.

1.6 Decreasing Transportation Budget Relative to Total State Budget

Each year, revenues collected from state and federal motor fuels taxes, DMV fees, the highway use tax, and other revenue sources go into three funding sources, (the Highway Fund, the Highway Trust Fund, and Federal aid) which are used to pay for North Carolina's transportation system. Together, the total revenue from these three sources are used to create the state's transportation budget. For the last 30 years the transportation budget has remained fairly constant at approximately 0.7 percent of North Carolina's Gross State Product (GSP).³⁶ In recent years, however, North Carolina's Highway Fund and Highway Trust Fund have declined in relation to North Carolina's gross state product (see Exhibit 10). This decline is even more significant when captured in relation to the state's total budget (see Exhibit 11). This downward trend of investment has also occurred at the national level. Over the last 50 years, public investment in transportation infrastructure has fallen from 3 percent to approximately 1 percent of U.S. gross domestic

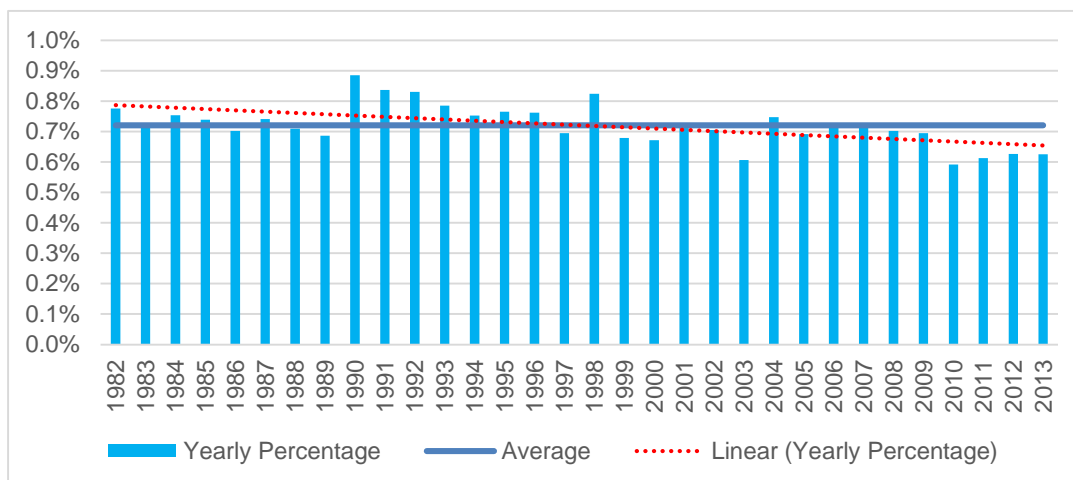
³⁵ Atkins, "NCDOT From Policy to Projects: North Carolina Statewide Transportation Plan," August 2012, http://www.ncdot.gov/download/performance/NCDOT_2040TransportationPlan.pdf

³⁶ U.S. Bureau of Economic Analysis and North Carolina Office of State Budget and Management

product.³⁷ These downward investment trends impair North Carolina's transportation system and negatively impact the state's businesses.

Exhibit 10

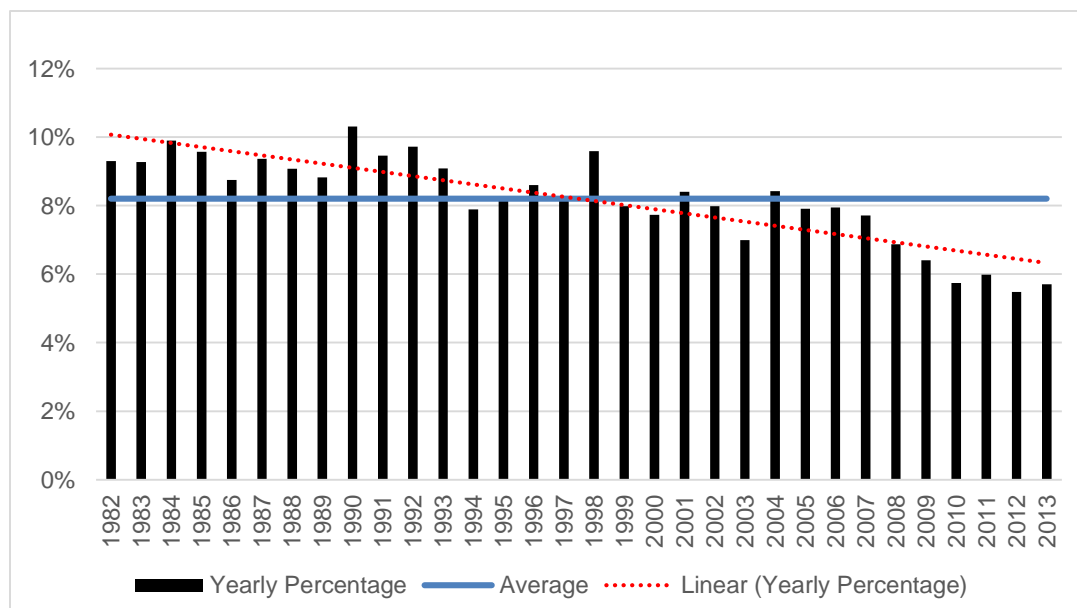
NC Highway and Highway Trust Fund as a Percentage of Gross State Product



Source: U.S. Bureau of Economic Analysis and North Carolina Office of State Budget and Management

Exhibit 11

NC Highway and Highway Trust Fund as a Percentage Total Authorized State Budget



Source: U.S. Bureau of Economic Analysis and North Carolina Office of State Budget and Management

³⁷ National Association of Manufacturers. "Catching Up," September 2014.

1.7 High Risk of Federal Funding Cuts

Over the last decade, Congress has habitually avoided making meaningful transportation investment decisions. After enacting the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005 (the previous bill authorizing transportation spending), Congress passed nine short-term extensions before finally authorizing the Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012.³⁸ As MAP-21 has recently expired in 2014, no infrastructure investment plan has been developed. Instead, Congress approved a “patch” to the Highway Trust Fund, effectively postponing any meaningful decisions until May 31, 2015.³⁹

A lack of planning at the federal level has coincided with a decline in reliable transportation revenue sources. Over the last decade, Congress has made transfers from the General Fund of the Treasury, amounting to \$54 billion since 2008,⁴⁰ as transportation investment needs have greatly outpaced transportation revenues collected through the federal motor fuels tax. Over the 2015-2024 period, transportation needs are projected to exceed revenues by \$167 billion.⁴¹ As the motor fuels tax continues to erode relative to inflation, and austerity measures continue to be embraced as a result of the Great Recession, it seems likely that North Carolina’s Department of Transportation will experience significant reductions in federal aid. Without any changes to current funding mechanisms, the Federal Highway Trust Fund is projected to become insolvent in May 2015.⁴²

Federal uncertainty has resulted in many states attempting to fend for themselves. Within the last two years, 38 states have attempted 121 different revenue enhancement mechanisms.⁴³ State level efforts have led to the successful adoption or reinstatement of a combined 30 revenue enhancement mechanisms.⁴⁴

³⁸ Alliance for American Manufacturing, “Infrastructure Investment Creates American Jobs,” October 2014, https://s.bsd.net/aamweb/main/page/file/9d937012edb12326c4_7vm62z7l5.pdf

³⁹ Ibid

⁴⁰ Ibid

⁴¹ “The Highway Trust Fund and the Treatment of Surface Transportation Programs in the Federal Budget,” June 11, 2014, Congressional Budget Office, <http://www.cbo.gov/publication/45416>

⁴² Tim Harlow, August 3, 2014, “Stopgap Funding for Highway Trust Fund Keeps MnDOT Projects on Track,” Star Tribune, <http://www.startribune.com/local/269760301.html>

⁴³ Data was collected from a combination of the following five sources: AASHTO State Funding Proposals (2013), Tracking State Transportation Funding Proposals (2013), Mileage-Based User Fees For Transportation Funding – A Primer for State and Local Decision Makers (2012), 2013 Comparative Data Report on State Transportation Programs (2013), and NCSL Transportation Funding and Finance Legislation Database (01 October 2013). Bonding and Public Private Partnerships were included in the table, but because they are instruments for financing, not revenue generation, they are not considered revenue enhancement mechanisms.

⁴⁴ Ibid

The revenue enhancement mechanisms that have been most commonly considered are:

- Gas tax increases or indexing (24 states)
- Sales tax (14 states)
- Other fees and fares (13 states)
- Vehicle Miles Traveled Fees (11 states)
- Tolling (7 states)

2.0 Economic Impact



2nd largest
highway system
with nearly
80,000 miles



72 public airports



Two water ports



Two inland
terminals



3,300 miles of
operated tracks



Public transit
system provided
in all 100
counties



Bike/pedestrian
facilities

Transportation infrastructure is deeply connected with the economic development of North Carolina. From providing access to jobs, education, and healthcare, to moving the goods and services relied on by North Carolina residents and businesses, a high-functioning transportation system is needed to create opportunities that maintain and expand economic development. Currently, North Carolina's infrastructure funding crisis is challenging the present and long-term efficacy of businesses. Congestion and poor roadway conditions are negatively impacting the movement of people and goods throughout the state.

The impacts borne from inadequate transportation investment are substantial. North Carolina roadways that lack some desirable safety features, have inadequate capacity to meet travel demands, or have poor pavement conditions cost drivers approximately \$6.5 billion annually in the form of additional vehicle operating costs, lost time, and wasted fuel (due to traffic congestion and crashes).⁴⁵ These issues are likely to be exacerbated as the state is projected to grow from 9.8 million to 13.5 million residents within the next 25 years.⁴⁶ As North Carolina attempts to accommodate rapid growth, meaningful transportation investment will be crucial.

Transportation investment has the potential to benefit North Carolina in various ways. Not only can proper investment lower congestion and improve road conditions, but it can also facilitate job growth, increase wage earnings, and grow North Carolina's gross state product (GSP). This section discusses the economic contribution of North Carolina's railroads, airports, seaports and shows how different investment levels may impact North Carolina's network of roads and bridges.

⁴⁵ TRIP, "North Carolina Transportation By the Numbers: Meeting the State's Need for Safe and Efficient Mobility," March, 2014. http://www.tripnet.org/docs/NC_Transportation_by_the_Numbers_TRIP_Report_March_2014.pdf

⁴⁶ "From Policy to Projects: 2040 Plan – North Carolina State Transportation Plan," NCDOT, August 2012. http://www.ncdot.gov/download/performance/NCDOT_2040TransportationPlan.pdf

2.1 North Carolina's Railroads

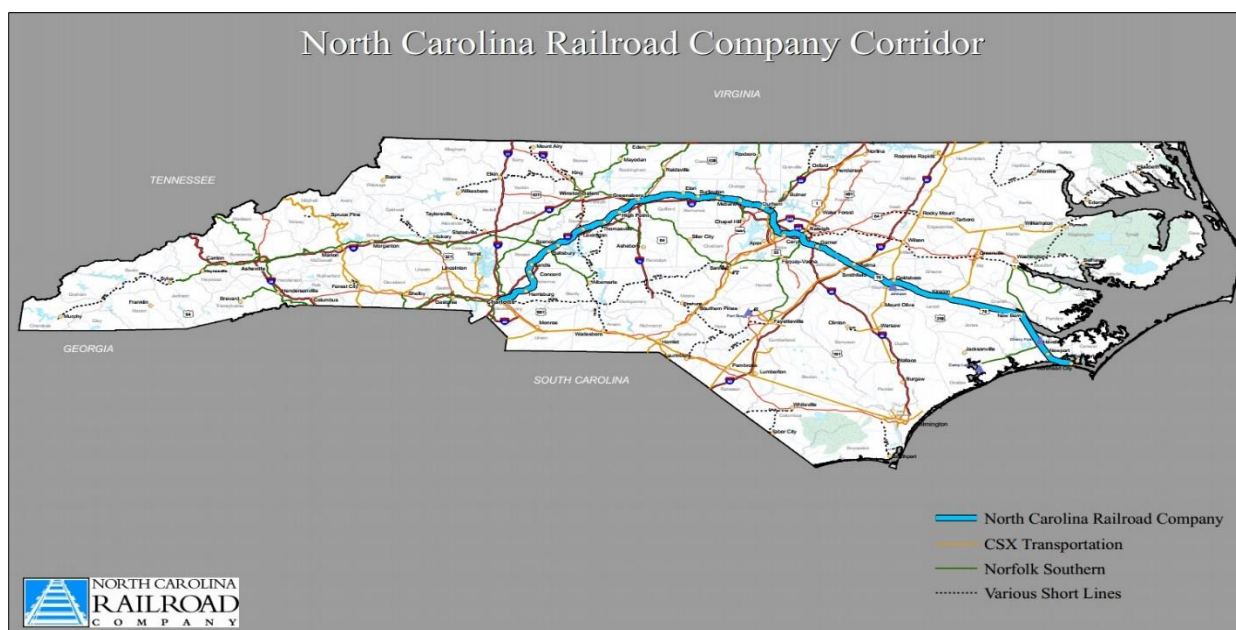
North Carolina's railroads help support businesses by increasing industry efficiencies and lowering transportation costs. North Carolina's freight rail network serves 86 of the state's 100 counties with the most densely traveled freight rail corridors in North Carolina owned and/or operated by two Class 1 railroad companies: CSX and Norfolk Southern.⁴⁷ The majority of the state's freight rail system is owned, operated, and maintained by the private sector. Of the 3,345 miles of rail lines throughout North Carolina,⁴⁸ 317 miles are owned by the state.⁴⁹ The economic impact of just the state-owned North Carolina Railroad Company was evaluated in 2014. This 317-mile railroad annually contributes to 2,800 jobs and \$794 million in gross state product (see Exhibit 12).⁵⁰

Exhibit 12

Annual Economic Contribution of the North Carolina Railroad (317 miles)

Rail Line	Jobs	Output (Gross State Product)
North Carolina Railroad	2,800	\$794 million

Source: RTI International 2014



Source: North Carolina Railroad Company

⁴⁷ NCDOT, "From Policy to Projects: North Carolina Statewide Transportation Plan," August 2012.

http://www.ncdot.gov/download/performance/ncdot_2040transportationplan.pdf

⁴⁸ Ibid

⁴⁹ George F. List and Robert S. Foyle, "Seven Portals Study: An Investigation of How Economic Development Can be Encouraged in North Carolina Through Infrastructure Investment" December 31, 2011.

<http://www.ncdot.gov/doh/preconstruct/tpb/research/download/2010-34-0masterfinalreport.pdf>

⁵⁰ Katherine Heller and Zack Oliver, "Measuring North Carolina Railroad Company's Impact on North Carolina," September 25, 2014. http://www.ncrr.com/wp/wp-content/uploads/2011/11/1030-am_RTI.pdf

2.2 North Carolina's Airports

Airports provide a vital link to regional, national, and international markets to many businesses in North Carolina. A portion of the revenues generated by these local businesses can be attributed to the provision of access to the markets they serve. The total economic contribution of North Carolina's publicly-owned airports is approximately \$25.9 billion while supporting over 108,000 jobs.⁵¹ As a frame of reference for the magnitude of the airports' annual contribution to the state's economy represents six percent of the gross state product. Exhibit 13 shows the economic contribution of North Carolina's airports.

Exhibit 13
Annual Economic Contribution of North Carolina's Airports

	Jobs	Income Contribution per Year	Economic Contribution per Year
General Aviation	15,460	\$0.48 billion	\$2.01 billion
Commercial	93,390	\$3.59 billion	\$23.87 billion
Total	108,850	\$4.06 billion	\$25.88 billion

Source: IMPLAN modeling Software

2.3 North Carolina's Seaports

The Port of Wilmington and the Port of Morehead City play an important role in the supply chain decisions of companies within North Carolina, providing them access to foreign markets and materials critical for success. There is approximately \$14 billion in annual economic contribution to the state's economy constituted by goods moving through North Carolina ports (\$12.9 billion attributed to the Port of Wilmington and \$1.1 billion attributed to the Port of Morehead City).⁵² The ports support over 76,700 jobs across the state of North Carolina with an income contribution of approximately \$4.28 billion per year.⁵³ Exhibit 14 demonstrates the economic contribution of North Carolina's ports.

Exhibit 14
Annual Economic Contribution of North Carolina's Seaports

Port	Jobs	Income Contribution per Year	Economic Contribution per Year
Wilmington	73,000	\$4.04 billion	\$12.9 billion
Morehead City	3,700	\$0.24 billion	\$1.1 billion
Total	76,700	\$4.28 billion	\$14.0 billion

Source: IMPLAN modeling Software

⁵¹ Daniel J. Findley et al., "Economic Contribution of North Carolina Airports," *Institute of Transportation Research and Education*, November 1, 2012.

⁵² Daniel J. Findley et al., "Economic Contribution of the North Carolina Ports," *Institute of Transportation Research and Education*, November 17, 2014.

⁵³ Ibid

2.4 North Carolina's Roads and Bridges

North Carolina's current investment level of approximately \$3.5 billion annually is not sufficient to prevent deterioration of its network of roads and bridges.⁵⁴ If investment continues at this level, it will likely result in increases in traffic congestion and poor roadway conditions that will negatively impact the productivity of state businesses. However, if North Carolina were to invest an additional \$2.2 billion annually (\$5.7 billion total) this would enable the state to maintain roadway conditions as they exist today (Level of Service (LOS) C).⁵⁵ Furthermore, if North Carolina were to invest an additional \$6.5 billion annually (\$10 billion total), it would result in a substantial improvement in the state's transportation system conditions (LOS A), thus enhancing the movement of people, goods, and services throughout North Carolina.⁵⁶

Exhibit 15 shows the economic impact of a billion dollars of transportation investment in terms of jobs, employee compensation and output (gross state product). Exhibit 16 shows the total impact of transportation investment for North Carolina's transportation system to achieve different levels of service. Exhibit 17 shows what the additional impacts of transportation investment are, beyond current levels of investment. Additionally,

Exhibit 15
Impacts of Infrastructure Spending (Construction and Long-Term)
per Billion of Infrastructure Investment

Investment	Jobs	Employee Compensation	Output
\$1 billion	14,300	\$10.3 billion	\$10.9 billion

Source: IMPLAN modeling Software

Exhibit 16
Total Potential Impacts of Infrastructure Spending (Construction and Long-Term) based
on Annual Investment Scenarios

Level of Service (LOS)	D (Current)	C	B	A
Level of Investment	\$3.5 billion	\$5.7 billion	\$7.0 billion	\$10.0 billion
Jobs	50,050	81,510	100,100	143,000
Employee Compensation	\$36.15 billion	\$58.87 billion	\$72.30 billion	\$103.28 billion
Output	\$38.06 billion	\$61.98 billion	\$76.11 billion	\$108.73 billion

Sources: NCDOT 2040 Plan and IMPLAN modeling Software

⁵⁴ "From Policy to Projects: 2040 Plan – North Carolina State Transportation Plan," NCDOT, August 2012.

http://www.ncdot.gov/download/performance/NCDOT_2040TransportationPlan.pdf

⁵⁵ Ibid

⁵⁶ Ibid

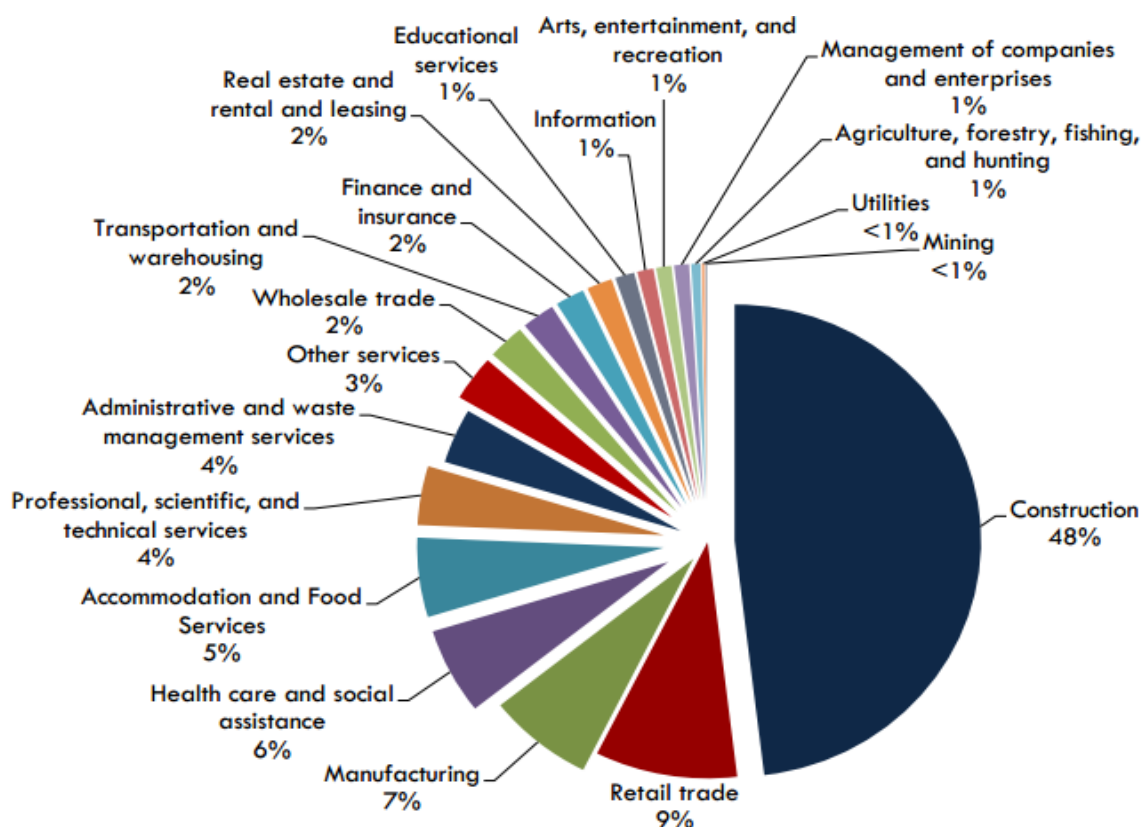
Exhibit 17
Differential Impacts of Infrastructure Spending (Construction and Long-Term) –
Difference from Current Level of Investment – based on Annual Investment Scenarios

Level of Service (LOS)	D (Current)	C	B	A
Level of Investment	N/A	\$2.2 billion	\$3.5	\$6.5 billion
Jobs	N/A	31,460	50,050	92,950
Employee Compensation	N/A	\$22.72 billion	\$36.15 billion	\$67.13 billion
Output	N/A	\$23.92 billion	\$38.06 billion	\$70.67 billion

Sources: NCDOT 2040 Plan and IMPLAN modeling Software

Transportation investment has wide-ranging impacts on North Carolina's economy. For example, investment in highway and bridge construction leads to the creation of jobs in highly varied sectors of North Carolina's economy. Exhibit 18 demonstrates how such investment supports various North Carolina jobs.⁵⁷

Exhibit 18
North Carolina Jobs Supported by Highway and Bridge Construction Investment



Source: ARTBA

⁵⁷ Alison Premo Black, "Transportation Investment and State and Local Funding Developments," ARTBA. December, 16, 2014.

2.5 Congestive Impacts on North Carolina's Economy

Traffic congestion also impacts North Carolina's economy. North Carolina's businesses and residents pay for congestion in the form of additional travel time and fuel consumption. North Carolina's congestion costs have been increasing relative to other states.⁵⁸ The Raleigh/Durham region provides an illustrative example of this. From 1982 to 2011, the region moved from the 72nd to the 61st most congested region in the United States.⁵⁹ During that time period, congested lane miles grew from 22 percent to 52 percent in the region. Across the state, North Carolina drivers spend more than \$2 billion annually, with congestion costs for the following regions⁶⁰:

- Asheville: \$380 million
- Charlotte: \$898 million
- Raleigh/Durham: \$502 million
- The Triad: \$465 million
- Wilmington: \$360 million

There is a very strong relationship between population growth and congestion level increases. In North Carolina's urban areas, a unit increase in population accounted for a corresponding increase in congestion over 90 percent of the time.⁶¹ Exhibit 19 shows the percent increase of congested lane miles that corresponds to a population increase of 100,000.

Currently, 9.8 million people live in North Carolina and by 2040, the state is projected to have 13.5 million residents. Assuming the state's population distribution remains as it is currently, changes in North Carolina's congested lane miles⁶² are projected in Exhibit 20. The exhibit shows changes from today to 2040.

Exhibit 19

Increase in Congested Lanes Miles per 100,000 Individuals

Region	% Increase in Congested Lane Miles per 100,000 individuals
Charlotte	4.3%
Greensboro	16.0%
Winston-Salem	9.6%
Raleigh/Durham	3.5%

Source: Derived from Texas Transportation Institute 2012 data

⁵⁸ Brad Wilson, 2007. "21st Century Transportation Committee Final Report," <http://www.wral.com/asset/traffic/2008/12/10/4111058/20081210172911021.pdf>

⁵⁹ David Schrank et. al, 2012. "Urban Mobility Report," Texas Transportation Institute, <http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/ums/congestion-data/ralei.pdf>

⁶⁰ TRIP, "North Carolina Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility," March 2014, http://www.tripnet.org/docs/NC_Transportation_by_the_Numbers_TRIP_Report_March_2014.pdf

⁶¹ Analysis from: TTI, "Annual Urban Mobility Report: Eastern U.S. Cities," 2012, <http://mobility.tamu.edu/ums/congestion-data/east-map>

⁶² Population and congested lane mile data are derived from TTI data (TTI, "Annual Urban Mobility Report: Eastern U.S. Cities," 2012, <http://mobility.tamu.edu/ums/congestion-data/east-map>). Population distribution and population increase projections are derived from NCDOT's 2040 plan (From Policy to Projects: Financial Plan and Investment Strategies," August 2012, North Carolina Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf.)

Exhibit 20**Projected Increase in Population and Congestion**

Region	Population Increase	Congested Lane Miles (2014 & 2040)
Charlotte	404,000	51-68%
Greensboro	132,500	28-49%
Winston-Salem	146,500	22-36%
Raleigh/Durham	536,000	52-70%

Source: Texas Transportation Institute 2012 data

Transportation investment could lead to significant travel time benefits for North Carolina's drivers. Congestive benefits are as follows:

- North Carolina's 6.6 million licensed drivers could experience a congestive benefit of \$98.5 million in time costs by 2020 and a benefit of \$827 million by 2040 under the LOS C investment scenario.
- North Carolina's 6.6 million licensed drivers could experience a congestive benefit of \$110.7 million in time costs by 2020 and a benefit of \$930.4 million by 2040 under the LOS A investment scenario.

2.6 Other Impacts on North Carolina's Economy

Pavement conditions also affect North Carolina's economy. Driving on roads in need of repair costs North Carolina motorists approximately \$1.8 billion a year in extra vehicle repair and operating costs⁶³ – an average of \$273 per motorist.⁶⁴ These costs reach into the hundreds of millions of dollars for the following regions⁶⁵:

- Asheville: \$251 million
- Charlotte: \$378 million
- Raleigh-Durham: \$268 million
- The Triad: \$315 million
- Wilmington: \$461 million

Keeping roads in acceptable condition not only lowers vehicle operating costs, but also has the potential to reduce overall transportation system maintenance costs. For example, if roads deteriorate to the point where reconstruction is needed, their maintenance costs climb dramatically. Road reconstruction costs approximately four times more than resurfacing.⁶⁶

Road conditions are intrinsically linked with driver safety. It is estimated that roadway features are likely a contributing factor in approximately one-third of fatal traffic crashes.⁶⁷ In North Carolina, a total of 6,585 people were killed in motor vehicle crashes in North Carolina from 2008 through 2012, an average of 1,317 fatalities per year.⁶⁸ Across the state, the annual cost of serious traffic crashes, in which roadway features were likely a contributing factor, is approximately \$2.7 billion with costs as such for the following regions⁶⁹:

- Asheville: \$318 million
- Charlotte: \$237 million
- Raleigh-Durham: \$235 million
- The Triad: \$289 million
- Wilmington: \$532 million

⁶³ TRIP, "North Carolina Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility," March 2014, http://www.tripnet.org/docs/NC_Transportation_by_the_Numbers_TRIP_Report_March_2014.pdf

⁶⁴ Derived from TRIP Report mentioned in footnote above and Federal Highway Administration, "Highway Statistics 2011: Licensed Total Drivers, by Age," Table DL-22

⁶⁵ TRIP, "North Carolina Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility," March 2014, http://www.tripnet.org/docs/NC_Transportation_by_the_Numbers_TRIP_Report_March_2014.pdf

⁶⁶ Gary Hicks et al., "Selecting a Preventive Maintenance Treatment for Flexible Pavements," June 14, 2000, <http://www.wsdot.wa.gov/NR/rdonlyres/F27BCD0A-793C-48EF-A795-6C57136C4437/0/PavementPreservation.pdf>

⁶⁷ TRIP, "North Carolina Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility," March 2014, http://www.tripnet.org/docs/NC_Transportation_by_the_Numbers_TRIP_Report_March_2014.pdf

⁶⁸ Ibid

⁶⁹ Ibid

2.7 Potential Impacts to Industries

The North Carolina Department of Commerce identified six key industries that play a significant role in the state's total economic output. These industries are included in Exhibit 21. In addition, the research team evaluated the retail industry for the purposes of this report.

The future success of each of these sectors is linked to the quality of North Carolina's surface transportation system. This section examines these six key industries and demonstrates how they rely on transportation investment.

Because the Bureau of Labor Statistics suppresses detailed industry data that may compromise business confidentiality, the team analyzed North Carolina's key industries at the three-digit NAICS subsector level. Even at this course level of detail, approximately 15 percent of the subsector records have been suppressed. The only exception to this three digit aggregation level includes the Aerospace, Aviation, and Defense industry group (NAICS industry group 4881), which includes support activities for air transportation.

Exhibit 21

NAICS Codes by Industry Group

Key industry group	NAICS code(s)
Aerospace, Aviation, Defense	481, 4881
Automotive, Truck & Heavy Equipment	326, 331, 332, 336
Biotech, Pharma, Life Sciences	325
Business & Financial Services	521, 522, 523, 524, 525, 533, 541, 551, 561, 813
Energy	221, 486, 425
Information & Communications Technology	333, 334, 335, 511, 515, 517, 518
Retail	441, 442, 443, 444, 445, 446, 447, 448, 451, 452, 453, 454

Some codes at the three digit subsector level will apply to several of North Carolina's key industries. NAICS 336 includes both motor vehicle manufacturing and aerospace product and parts manufacturing,⁷⁰ and NAICS 541 includes many financial services as well as scientific and developmental services.⁷¹ Subsectors were linked to the key industry groups where they were best represented, and since more establishments in 336 relate to the automotive, truck & heavy equipment group, its employees are counted there. The figures provided for the number of establishments and employees represent estimates.

Data from Quarterly Census of Employment and Wages compiled in the first quarter of 2014 by the Bureau of Labor Statistics was used to calculate the number of establishments, employees, average wages, and location quotient. The top four counties, by location quotient, are listed as reporting key industry groups well. All reported counties must also have a location quotient greater than 2.0 and be represented by more than 500 employees in the county.

⁷⁰ "Transportation Equipment Manufacturing: NAICS 336," <http://www.bls.gov/iag/tgs/iag336.htm>

⁷¹ "Professional, Scientific, and Technical Services: NAICS 54," <http://www.bls.gov/iag/tgs/iag54.htm>

2.7a Aerospace, Aviation, and Defense

By the definitions above, the Aerospace, Aviation, and Defense industry grouping includes approximately 333 firms in North Carolina, and directly employs more than 20,000 people. This industry grouping is highly concentrated in Buncombe, Forsyth, and Mecklenburg counties. At the national level, approximately 93.1 percent of the firms in this NAICS subsector are classified as small businesses, employing fewer than 100 people.⁷²

Agglomeration economics. Aerospace, Aviation, and Defense firms benefit by locating near one another, even if the firms are competitors. Agglomeration economies occur when the cost of production is lower in relatively dense clusters of other firms or specialized resources. These densely clustered firms experience economies of scale in production or distribution and draw on a more diversified and deep pool of workers.⁷³ Both airlines and passengers gain from a concentration of air services – airlines gain by concentrating services at a local hub even with the presence of additional competitors, because it enables airlines to use larger and more economical aircraft.⁷⁴

Business logistics. Business logistics cost \$1,385 billion in 2013, or 8.2 percent of national GDP. Of that amount, air transportation accounts for \$33 billion.⁷⁵ At a national level, the value of shipments made by air were valued at \$397 billion in 2012.⁷⁶ In 2007, the last year for which state-level data is available, shipments originating in North Carolina made by air were valued at \$5.4B. This is almost double the value of shipments made by air in 2002, and represents an annual average increase of 58.2 percent.⁷⁷ When the movement of these goods becomes unreliable, costs associated with warehousing this inventory increases, and decreases the competitiveness of using air transportation.⁷⁸

⁷² US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

⁷³ Harrison et. al, 1996, "Innovative Firm Behavior and Local Milieu: Exploring the Intersection of Agglomeration, Firm Effects, and Technological Change," *Economic Geography*, <http://www.jstor.org/stable/144400>

⁷⁴ Starkie, David, 2002, "Airport regulation and competition," *Journal of Air Transport Management*, <http://www.sciencedirect.com/science/article/pii/S0969699701000151>

⁷⁵ Schulz, John, 2014, "25th Annual State of Logistics: It's complicated," *Logistics Management*, http://www.logisticsmgmt.com/article/25th_annual_state_of_logistics_its_complicated

⁷⁶ US Census, 2012, "CFS Preliminary Report: Shipment Characteristics by Mode of Transportation: 2012" Commodity Flow Survey, http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=CFS_2012_00P1&prodType=table

⁷⁷ US Census, 2002, 2007, "Geographic Area Series: Shipment Characteristics by Destination State by Origin Geography by Mode: 2007 and 2002," Commodity Flow Survey, <http://factfinder2.census.gov/bkmk/table/1.0/en/CFS/2007/00A01/04000000US37>

⁷⁸ List, et. al, 2008, "Statewide Logistics Plan for North Carolina," North Carolina Office of State Budget and Management, http://www.ncdot.gov/download/business/committees/logistics/statewidelogisticsplan_080513.pdf

Fostering innovation. Promoting strong air transportation and freight supports other key industry groupings. A senior vice president with URS Corp's nuclear energy division recently cited the region's strong air links as a factor in the firm's decision to locate its nuclear operations headquarters to Charlotte in 2008.⁷⁹

⁷⁹ Arend, Mark, 2010, "Power Play: Energy Industry Jobs are the 'North Star' of a Charlotte-area sector building initiative," *Site Selection Magazine*, <http://www.siteselection.com/issues/2010/sep/North-Carolina.cfm>

2.7b Automotive, Truck, and Heavy Equipment

Approximately 2,430 firms are in the Automotive, Truck, and Heavy Equipment industry grouping, and more than 106,000 people are employed in related industries. This industry grouping is well represented throughout the state, with major centers of employment located in Rowan, Lee, Gaston, and Beaufort counties.

The Automotive, Truck, and Heavy Equipment industries includes firms engaged in motor vehicle manufacturing, fabricated metal manufacturers, and makers of plant and rubber, among others. At the national level, approximately 91.4 percent of these firms are classified as small businesses with fewer than 100 employees.⁸⁰ The value of goods shipped from this industry grouping was more than \$66 billion in 2007.⁸¹ These firms, similar to others engaged in heavy manufacturing, experience gains in transportation investments in several important ways.

Business Logistics. The Automotive, Truck, and Heavy Equipment industry grouping requires a robust transportation logistics distribution network in order to deliver products. In 2008, industry respondents were asked what infrastructure improvements were necessary in order to improve goods movement in North Carolina; respondents overwhelmingly reported that decreasing highway congestion was the group's top priority.⁸²

Spillover savings. In 2013, the transportation costs of goods carried on motor carriers was valued at \$657 billion.⁸³ By one estimate, the rate of return for improving transport bottlenecks may be as high as 10 percent, when considering the gains in freight volume and reduced transport price.⁸⁴

Agglomeration economics. Heavy manufacturing included in this industry grouping benefits by locating near one another, even if the manufacturers are competitors. Because densely clustered

⁸⁰ US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

⁸¹ SCTG codes 24, 32, 34, 36, and 37; includes plastics and rubber, base metal in primary or semi-finished forms and in finished basic shapes, machinery, motorized and other vehicles (including parts), and transportation equipment.

US Census, "Table 5a. Shipment Characteristics by Two-Digit Commodity for State of Origin: 2007," *Commodity Flow Survey*, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/commodity_flow_survey/2007/states/north_carolina/index.html

⁸² List, et. al, 2008, "Statewide Logistics Plan for North Carolina," North Carolina Office of State Budget and Management, http://www.ncdot.gov/download/business/committees/logistics/statewidelogisticsplan_080513.pdf

⁸³ Schulz, John, 2014, "25th Annual State of Logistics: It's complicated," *Logistics Management*, http://www.logisticsmgmt.com/article/25th_annual_state_of_logistics_its_complicated

⁸⁴ Zhigang Li, Yu Chen, 2013, "Estimating the social return to transport infrastructure: A price-difference approach applied to a quasi-experiment," *Journal of Comparative Economics*, <http://www.sciencedirect.com/science/article/pii/S0147596712000716>

firms experience economies of scale in production or distribution and draw on a more diversified and deeper pool of workers.⁸⁵

Inter-industry linkages. The Automotive, Truck, and Heavy Equipment industries also support the movement of goods from North Carolina transported by truck; in 2013, the transportation costs of goods carried on motor carriers was valued at \$657 billion.⁸⁶

⁸⁵ Harrison et. al, 1996, "Innovative Firm Behavior and Local Milieu: Exploring the Intersection of Agglomeration, Firm Effects, and Technological Change," *Economic Geography*, <http://www.jstor.org/stable/144400>

⁸⁶ Schulz, John, 2014, "25th Annual State of Logistics: It's complicated," *Logistics Management*, http://www.logisticsmgmt.com/article/25th_annual_state_of_logistics_its_complicated

2.7c Biotechnology, Pharmaceuticals, and Life Sciences

The Biotechnology, Pharmaceutical, and Life Sciences industry grouping includes approximately 549 firms and directly employs more than 42,000 people in North Carolina. This industry grouping is best represented in Durham and the Research Triangle, but is also well-represented in New Hanover, Orange, and Wake counties. Pharmaceutical products shipped from North Carolina were valued at \$37 billion in 2007.⁸⁷

Firms included in this industry grouping include those involved with pharmaceutical and medicine manufacturing. At the national level, approximately 85.1 percent of these firms are classified as small businesses, with fewer than 100 employees.⁸⁸ Biotechnology, Pharmaceuticals, and Life Sciences may be supported in several important ways as well.

Fostering innovation. As a knowledge-based group of industries, Biotechnology, Pharmaceuticals and Life Sciences depend on a specialized workforce in very concentrated clusters. Studies suggest that workers who face more difficult commutes or less access to transit demand higher wages to compensate for the lost leisure time, and this may be especially true for highly skilled workers in urban areas.⁸⁹ Improving transportation infrastructure may improve the competitiveness of the firms, particularly with regard to recruiting and retaining talented employees.

Access to global markets. Firms in this industry grouping benefit from infrastructure improvements in the Research Triangle area, and all of the cluster areas identified above are located on major interstates (primarily I-40 and I-85), which are often subject to significant congestion. As mentioned earlier, the rate of return for improving transport bottlenecks may be as high as 10 percent, when considering the gains in freight volume and reduced transport price.⁹⁰ The Office of Economic Co-operation and Development (OECD) observe that congestion costs are especially high for industries transporting a high number of perishable or refrigerated goods, such as are commonly used for pharmaceuticals.⁹¹

⁸⁷ US Census, "Table 5a. Shipment Characteristics by Two-Digit Commodity for State of Origin: 2007," *Commodity Flow Survey*, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/commodity_flow_survey/2007/states/north_carolina/index.html

⁸⁸ US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

⁸⁹ NCHRP, 2001, "Economic Impacts of Congestion," *Transportation Research Board, National Research Council*, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_463-a.pdf

⁹⁰ Zhigang Li, Yu Chen, 2013, "Estimating the social return to transport infrastructure: A price-difference approach applied to a quasi-experiment," *Journal of Comparative Economics*, <http://www.sciencedirect.com/science/article/pii/S0147596712000716>

⁹¹ OECD, 2007, "Managing Urban Traffic Congestion,"

2.7d Business and Financial Services

North Carolina's robust Business and Financial Service industry grouping includes approximately 69,476 firms, and directly employs more than 725,000 people. This industry grouping is especially well-represented in the banking center of Mecklenburg county, as well as New Hanover, Wake, and Guilford counties. At the national level, these firms are overwhelmingly classified as small businesses, with 97.1 percent of the firms classified as small businesses with fewer than 100 employees.⁹²

Changing Agglomeration Economies. North Carolina's banking resources in Charlotte are second only to New York City and were valued at \$2.3 billion in 2008.⁹³ Other cities in North Carolina have also developed major banking centers, following the recent national trend of banking centers, which is moving toward larger cities.⁹⁴ However, while banking may be more concentrated in large cities, it is becoming more disaggregated in other ways. Of the key industry groupings discussed here, business and financial services have experienced some of the most significant changes over the last thirty years, when deregulation relaxed geographic restrictions. Over this period, the distance between a full-service US commercial bank and those banks' branches increased by almost 25 miles.⁹⁵ The implications of these shifts are currently under study. However, a robust transportation network could decrease the cost burden of bank employees traveling between full service banks and branches, costs associated with monitoring borrowers, as well as the costs incurred by customers traveling to these banks.

Fostering innovation. Recent research suggests that the level of innovation in banking and finance may have changed as a result of the industries' recent shift. A 2008 study suggests that as the functional distance between banks and local innovative firms increases, banks are less likely to adopt innovative technologies and overcome information asymmetries.⁹⁶ Improving transportation infrastructure to decrease this functional distance may enable the banking and finance industries to identify opportunities to support innovation in North Carolina.

⁹² US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

⁹³ Charlotte Chamber, 2009, <http://charlottechamber.com/business-profile/leading-financial-center/>

⁹⁴ DeYoung et. al, 2004, "The Changing Geography of the US Banking Industry," *The Industrial Geographer*, <http://igeographer.lib.indstate.edu/klier.pdf>

⁹⁵ DeYoung et. al, 2004, "The Changing Geography of the US Banking Industry," *The Industrial Geographer*, <http://igeographer.lib.indstate.edu/klier.pdf>

⁹⁶ Alessandrini, et. al, 2009, "Geographical Organization of Banking Systems and Innovation Diffusion," *Springer Science + Business Media*, <http://www.univpgri-palembang.ac.id/perpus-fkip/Perpustakaan/Geography/Geografi%20manusia/Geography%20Banking%20and%20Finance.pdf>

2.7e Energy

North Carolina's Energy industry grouping includes approximately 8,675 firms, and directly employs more than 48,000 employees. This industry grouping is well-represented in Gaston, Pitt, Union, and Mecklenburg counties. The value of gasoline, fuel oils, and coal shipped from North Carolina was \$16 billion in 2007.⁹⁷

This industry grouping includes utilities, pipeline transportation, and wholesale electronic markets and agents. More than 98.3 percent of these businesses are classified as small businesses at the national level, with fewer than 100 employees.⁹⁸ This industry grouping is able to benefit from transportation improvements in a few important ways described below.

Business logistics. North Carolina currently has no fossil fuel energy production, and currently does not produce enough electricity to meet demand. However, North Carolina's average retail price of electricity is \$.0915/kWh, slightly below the national average of \$.0984/kWh.⁹⁹ Maintaining low transportation costs for fuels entering the states is critical in order to maintain low utility costs. Energy Information Administration (EIA) officials report that electric utilities often determine their primary transportation method based on the proximity of a rail system.¹⁰⁰ The EIA reports that two-thirds of coal used by energy producers was shipped either in part or completely by rail,¹⁰¹ and costs associated with transporting coal by rail accounted for 43 percent of the delivered cost.¹⁰² As coal remains the primary resource for electricity generation in the state,¹⁰³ maintaining strong rail infrastructure is a critical factor in maintaining the competitiveness of the Energy industry grouping.

Fostering innovation. North Carolina ranks sixth in the nation for net electricity generation from nuclear power.¹⁰⁴ The International Atomic Energy Agency, an international organization that coordinates closely with the United Nations to promote the use of nuclear energy, emphasizes

⁹⁷ SCTG 17-19. US Census, "Table 5a. Shipment Characteristics by Two-Digit Commodity for State of Origin: 2007," *Commodity Flow Survey*, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/commodity_flow_survey/2007/states/north_carolina/index.html

⁹⁸ US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

⁹⁹ US Energy Information Administration, 2012, "State Energy Profiles," <http://www.eia.gov/electricity/state/>

¹⁰⁰ Stagi, Jeff, 2014, "Mines, utilities bolster rail infrastructure to keep power plants fueled," *Progressive Railroading*, <http://www.progressiverailroading.com/shippers/article/Mines-utilities-bolster-rail-infrastructure-to-keep-power-plants-fueled--40991>

¹⁰¹ Dorjets, Vlad, 2014, Railroad deliveries continue to provide the majority of coal shipments to the power sector," US Energy Information Administration, <http://www.eia.gov/todayinenergy/detail.cfm?id=16651>

¹⁰² <http://www.eia.gov/coal/transportationrates/>

¹⁰³ US Energy Information Administration, 2012, "North Carolina State Energy Profile," <http://www.eia.gov/state/print.cfm?sid=NC>

¹⁰⁴ US Energy Information Administration, 2012, "North Carolina State Energy Profile," <http://www.eia.gov/state/print.cfm?sid=NC>

the importance of secure and reliable transportation infrastructure when transporting fuel and nuclear waste to nuclear power generating facilities.¹⁰⁵

¹⁰⁵ IAEA, 2006, "Basic infrastructure for a nuclear power project," http://www-pub.iaea.org/mtcd/publications/pdf/te_1513_web.pdf

2.7f Information and Communications Technology

Information and Communications Technology industry grouping includes approximately 4,837 firms and directly employs more than 150,000 people. This industry grouping is very well represented in Durham county, as well as Cleveland, Wake, and Mecklenburg. The value of electronics and other electrical equipment shipped from North Carolina in 2007 was almost \$29 billion.¹⁰⁶ At the national level, 91.3 percent of the firms in these industries are classified as small businesses, with fewer than 100 employees.¹⁰⁷

The Information and Communications industry grouping includes firms engaged in computer and electronic product manufacturing, publishing (excluding internet), broadcasting, telecommunications, and data processing. These firms benefit from transportation improvements in several important ways.

Fostering innovation. Firms in this industry grouping draw employees from young professionals who prioritize bicycle lanes and transit over other types of transportation investments.¹⁰⁸ Supporting transportation investments that enables this industry group to attract a strong workforce will improve North Carolina's global competitiveness.

Spillover savings. As mentioned before, workers who face more difficult commutes or less access to transit demand higher wages to compensate for the lost leisure time. Research suggests this is especially true for highly skilled workers in urban areas.¹⁰⁹ Improving transportation infrastructure may improve the competitiveness of this industry group, particularly in the areas in which it is most highly concentrated.

¹⁰⁶ SCTG 35; includes electronic and other electrical equipment and components and office equipment. US Census, "Table 5a. Shipment Characteristics by Two-Digit Commodity for State of Origin: 2007," *Commodity Flow Survey*, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/commodity_flow_survey/2007/states/north_carolina/index.html

¹⁰⁷ US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

¹⁰⁸ Florida, Richard, 2002, "The Rise of the Creative Class," *Washington Monthly*, <http://www.washingtonmonthly.com/features/2001/0205.florida.html>

¹⁰⁹ NCHRP, 2001, "Economic Impacts of Congestion," *Transportation Research Board, National Research Council*, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_463-a.pdf

2.7g Retail

The large retail industry grouping includes approximately 34,017 firms in North Carolina, and more than 464,403 direct employees. This industry grouping is well represented throughout the state, but is particularly concentrated in Randolph, Person, Edgecombe, and Union counties. In 2009, the most recent year for which data is available, residents of North Carolina drove more than 9.1 billion miles in order to shop and run errands, roughly 12 percent of all vehicle miles traveled (VMT).¹¹⁰

At the national level, approximately 98.3 percent of these firms are classified as small businesses, with fewer than 100 employees. Retail firms represent roughly 11.4 percent of all establishments in the country.¹¹¹

Business logistics. The retail sector has undergone significant changes in recent years, with the growing use of online shopping and ever-shorter delivery times. Forrester Research reports that Americans will purchase roughly \$89 billion worth of goods online during the holidays, an increase of 13 percent over the last holiday season.¹¹² In order to maintain competitive, many retailers are offering same day delivery services through innovative service providers like Google Shopping Express and WeDeliver.¹¹³ Travel time reliability is an important factor in providing same day delivery.

Spillover savings. As mentioned before, the transportation costs of goods carried in the United States on motor carriers was valued at \$657 billion in 2013.¹¹⁴ By one estimate, the rate of return for improving transport bottlenecks may be as high as 10 percent, when considering the gains in freight volume and reduced transport price.¹¹⁵ Reducing these bottlenecks will ensure that Retail in North Carolina remains competitive.

Global competitiveness. With the increase in online shopping, local retail seeks new ways to remain competitive. Certain types of transportation investments may support the competitiveness of retail located in North Carolina. One study found that proximity to light rail promoted growth

¹¹⁰ National Household Travel Survey, 2009, "2009 NHTS: Number of Vehicle Miles (VMT) by Purpose," *US Federal Highway Administration*, <http://nhts.ornl.gov/tables09/ae/work/Job37005.html>

¹¹¹ US Census, 2012, "Geography Area Series: County Business Patterns by Employment Size Class," County Business Patterns, <http://factfinder2.census.gov/bkmk/table/1.0/en/BP/2012/00A3>

¹¹² Abrams, R. 2014, "Stung Last Year, Retailers and Shippers Retool for the Holiday Season," *The New York Times*, <http://www.nytimes.com/2014/11/03/business/03retail.html>

¹¹³ Livingston, S. 2014, "Local and national businesses battle for same-day delivery supremacy," <http://news.medill.northwestern.edu/chicago/news.aspx?id=231340>

¹¹⁴ Schulz, John, 2014, "25th Annual State of Logistics: It's complicated," *Logistics Management*, http://www.logisticsmgmt.com/article/25th_annual_state_of_logistics_its_complicated

¹¹⁵ Zhigang Li, Yu Chen, 2013, "Estimating the social return to transport infrastructure: A price-difference approach applied to a quasi-experiment," *Journal of Comparative Economics*, <http://www.sciencedirect.com/science/article/pii/S0147596712000716>

of retail sales by more than 36 percent in one area, compared to a citywide growth of only 3.6 percent.¹¹⁶ Similarly, cyclists tend to make more frequent purchases at smaller businesses closer to their homes.¹¹⁷ Transportation investments that encourages North Carolina shoppers to make their purchases locally will support the retail industry in the state.

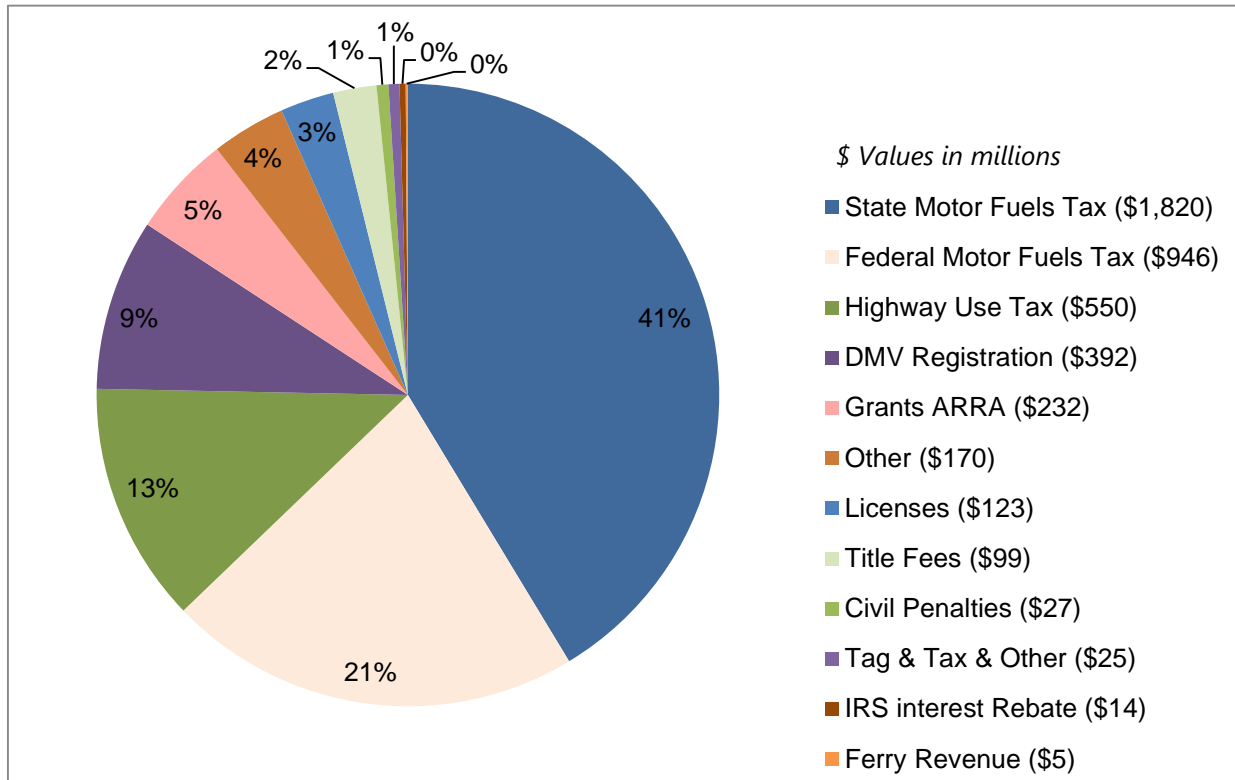
¹¹⁶ Weinstein, S, and Clower, T, 1999, "The Initial Economic Impacts of the DART Light Rail Transit System," *Dallas Area Rapid Transit*, <http://digital.library.unt.edu/ark:/67531/metadc30378/>

¹¹⁷ Popovich, N, and Handy, S, 2013, "Bicyclists as Consumers: Mode Choice and Spending Behavior in Downtown Davis, CA," *Transportation Research Board*, <http://docs.trb.org/prp/14-3063.pdf>

3.0 North Carolina Revenue Options

Exhibit 22

2013 NC Revenue Sources (\$4.4 Billion)



Source: NCDOT, "Sources and Uses Chart 2013-2014"

3.1 Current Transportation Revenue Streams

In fiscal year 2013-2014 the North Carolina Department of Transportation collected \$4.4 billion in revenue, with state and federal motor fuels taxes accounting for approximately two-thirds of transportation funding in North Carolina (see Exhibit 22).¹¹⁸ North Carolina currently practices a user-fee approach to fund its transportation system, in which fees associated with the system account for the vast majority of funding. In FY2013-14, approximately 96 percent of NCDOT's revenue was collected from transportation user fees.¹¹⁹ Under the state's current transportation funding paradigm a North Carolina driver pays (on average) \$640 annually, or approximately

¹¹⁸ NCDOT, "2013-14 NCDOT Sources and Uses Chart,"

<http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>

¹¹⁹ Ibid.

\$53.33 per month in user fees. This includes the federal motor fuels tax, which accounts for \$170 per year or approximately \$14 per month (see Exhibit 23).

Nationwide, drivers spend \$6,000 to \$10,000 annually for owning and operating a vehicle (dependent on vehicle type).¹²⁰ Of that expenditure, \$640 is spent on fees that support the state's surface transportation system (see Exhibit 23). This section discusses those fees and provides alternative sources for generating revenue.

Relative to North Carolina's four neighbors (Georgia, South Carolina, Tennessee, and Virginia) only Georgia collects a higher proportion of revenue from user fees (see Exhibit 24). User fees are comprised of any fees associated with transportation system use (motor fuels taxes, highway use tax, DMV fees, etc). Non-user fees are those not associated with transportation system use (i.e. sales taxes, property taxes, general fund transfers, etc.). Under funding paradigms where there are high proportions of user-fees, it is generally system users who pay to maintain that system. In paradigms where there are low proportions of user-fees, those who do not directly use the system still pay for it. For a more in-depth discussion about the differences of these funding paradigms, see the "User Fee and Non-User Fee Discussion about Business Impacts" section of this report (section 3.4).

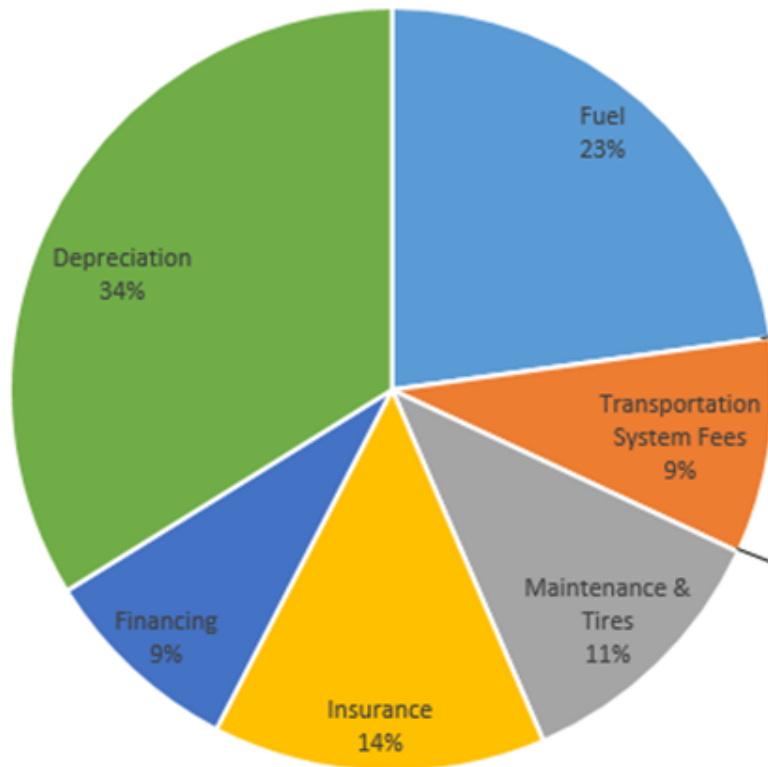
Of North Carolina's neighbors, Virginia has the lowest proportion of user fees.¹²¹ This is because Virginia generates a large portion of its transportation revenue through a retail sales and use tax. Economic theory suggests, when the quantity users pay becomes disassociated with the use of the goods or services they receive, it generally results in system distortions. Thus, Virginia may be more vulnerable to system distortions than North Carolina. However, as many states are grappling with how to best handle the nationwide trend of declining motor fuels receipts, Virginia appears to be well-situated to cope with this challenge.

¹²⁰ AAA, "Owning and Operating Your Vehicle Just Got a Little Cheaper," May 9, 2014.

¹²¹ Source: VDOT, "Fiscal Year 2015: VDOT Annual Budget – June 2014," http://www.virginiadot.org/VDOT/About_VDOT/asset_upload_file572_58764.pdf

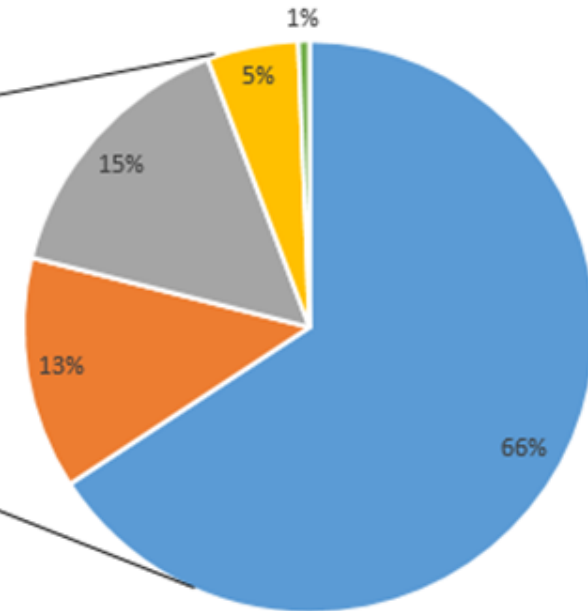
Exhibit 23

Average Vehicle Ownership & Operation Expenses per Licensed Driver (\$7,100)



System Fees per Licensed Driver (\$640)

- State & Federal Motors Fuel Taxes
- Motor Vehicle Fees
- Civil Penalties
- Highway Use Tax
- Other



Sources: AAA, "Your Driving Costs," 2014; NCDOT, "2013-14 NCDOT Sources and Uses Chart; FHWA, "Annual Vehicle Miles Traveled," 2011; FHWA, "Licensed Total Drivers, by Age" 2011

Exhibit 24**NCDOT's Budget and Road Characteristics in Relation to Neighboring States**

State	Annual Budget (in billions)	State Maintained Lane Miles	Revenue from user fees	Revenue from Motor Fuels Tax	State Motor Fuels Tax
North Carolina (FY 2013-14)	\$4.4	168,029	96 %	68 %	\$0.365
Georgia (FY 2013-14)	\$2.2	105,450	99 %	99 %	\$0.275
South Carolina (FY 2011-12)	\$1.3	82,888	94 %	93 %	\$0.168
Tennessee (FY 2014-15)	\$1.8	37,111	92 %	77 %	\$0.214
Virginia (FY 2014-2015)	\$4.2	125,756	82 %	16 %	\$0.173

See footnote for table sources¹²²

¹²² North Carolina Source: North Carolina Department of Transportation, "2013-14 NCDOT Sources and Uses Chart," <http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>; FHWA, "Relationships Between Asset Management and Travel Demand," 2012. <http://www.fhwa.dot.gov/infrastructure/asstgmt/vmt03.cfm>

Georgia Source: Georgia Department of Transportation, "Fact Book," 2013. <http://www.dot.ga.gov/informationcenter/pressroom/Documents/publications/FactBook/GeorgiaDOT-FactBook.pdf>; GDOT, "Public Road Mileage By Road Type," December 2013.

http://www.dot.ga.gov/informationcenter/statistics/RoadData/Documents/437/DPP437_2013.pdf

South Carolina Sources: South Carolina Department of Transportation, "Comprehensive Annual Financial Report of South Carolina Department of Transportation," June 30, 2011. http://www.dot.state.sc.us/inside/pdfs/cafr_2010-2011.pdf; "South Carolina's State Highway System,"

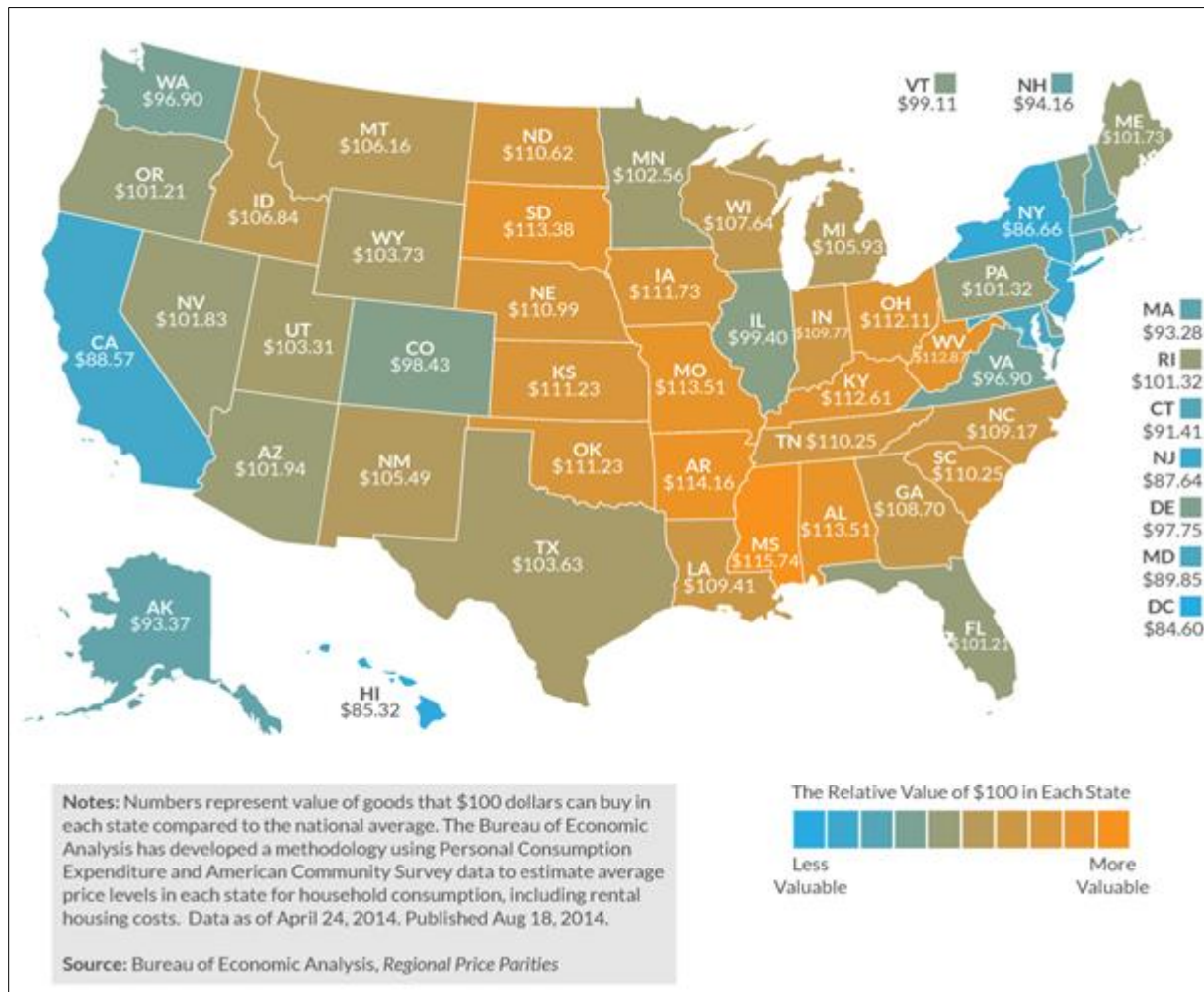
http://www.sctrucking.org/files/Components_of_SC_Highway_System.pdf

Tennessee Source: Tennessee Department of Transportation, "Tennessee Department of Transportation Work Program Comparison," 2014. <http://www.tdot.state.tn.us/gastax/wpcomparison.htm> and Steve Bert phone correspondence with TDOT staff member, October 2, 2014.

Virginia Source: Virginia Department of Transportation, "Fiscal Year 2015: VDOT Annual Budget."

http://www.virginiadot.org/VDOT/About_VDOT/asset_upload_file572_58764.pdf

State Motor Fuels Taxes Source: American Petroleum Institute, "Gasoline Tax," 2014. <http://www.api.org/oil-and-natural-gas-overview/industry-economics/fuel-taxes/gasoline-tax>

Exhibit 25**The Relative Value of \$100 Across the 50 States**

Source: Tax Foundation, "The Real Value of \$100 in Each State," August 18, 2014

3.2 Revenue Generation Options

Businesses depend on state-of-the-art transportation infrastructure to efficiently transport necessary components and final goods to their destinations.¹²³ As North Carolina considers revenue options to bolster transportation investment, it may also consider how the quality of surface transportation infrastructure may affect the state's overall standard of living. Currently, North Carolina is ranked 18th (of the 50 states) in the quantity of goods that \$100 can buy.¹²⁴ This

¹²³ Alliance for American Manufacturing, "Infrastructure Investment Creates American Jobs," October 2014, https://s.bsd.net/aamweb/main/page/file/9d937012edb12326c4_7vm62z7i5.pdf

¹²⁴ Tax Foundation, "The Real Value of \$100 in Each State," August 18, 2014. <http://taxfoundation.org/sites/taxfoundation.org/files/docs/Price-Parity-2012.png>

is another way of showing that North Carolina ranks better than 64 percent of the nation in overall cost of living. As North Carolina looks to the future, transportation investment will play a vital role in ensuring that goods and services are efficiently transported to their final destinations. This, in turn, will help maintain a low cost of living, relative to other states.

This section of the report discusses 16 options for revenue generation in North Carolina:

- Vehicle Miles Traveled Fee
- Fine-based Fees
- Heavy Vehicle Fees
- Severance Fees
- Vehicle Title, Registration, Vanity Plate Fees
- Highway Use Tax
- State Motor Fuels Tax
- Flat-rate Tolling
- High-Occupancy Toll Lanes
- Cordon Pricing (Priced Zones)
- Statewide Sales Tax
- Income Tax
- Property Tax
- Payroll Tax
- Advertising Revenue
- Value Capture

These options are defined, their current use is demonstrated, and implementation characteristics are discussed. Following the discussion of these 16 revenue options, each option is ranked on the basis of six criteria:

- Yield adequacy
- Stability
- Implementation and Administration
- Equity
- Economic Efficiency
- Public Acceptance and Feasibility

Each of the 16 revenue option was evaluated on the basis of the six criteria, which are defined in Exhibit 26. Options are then given a score of 1-5 in these six categories, an overall score, and ranked on the basis of their overall scores in section 3.3.

Exhibit 26**Criteria for Ranking Revenue Generating Options**

Importance	Criteria	Rationale
I	Yield Adequacy	Ultimately, the amount of revenue a funding option is able to draw will be the major determining factor in the scope of any project. There must be enough money available to support the project in its entirety, over what may potentially be a very long period of time.
	Stability	Hand-in-hand with 'Yield Adequacy', the reliability of the funding option to provide the revenue expected to move the project forward as planned is of utmost importance. Not only must the option provide revenue consistently, but must also be <i>expected</i> to do so to allow for good planning and room for flexibility. A high degree of reliability translates to good credit, which can be leveraged for financing.
II	Implementation and Administration	The funding option should be easy to set up and maintain. Reducing extraneous costs in time, money, and effort associated with initiating and supporting an option allows the maximum amount of potential revenue to go towards its intended purpose. By minimizing deadweight losses, these costs arising from structural inefficiencies, revenue sources can be streamlined and applied to their greatest effect.
	Equity	The most significant non-pecuniary criteria: equity in the distribution of the cost burden is seen as universally important not only in garnering 'Public Acceptance' but also in fulfilling obligations to populations which require the benefits of infrastructure projects to improve their economic station, in which presently they are unable to afford such improvements alone. This criteria subdivides into distribution of costs based on the user's ability to sustain the cost and on users paying for their respective derived benefits.
III	Economic Efficiency	This criteria ensures the funding option creates clear economic signals that the revenue being generated is truly going towards its intended purpose and that there is a measurable relationship between the costs incurred and the benefits derived. Further, it seeks to minimize the adverse impacts the cost burden might have on the populations which the project is intended to benefit by ensuring the funding option does not distort local markets.

Criteria	High (5)	Med-High (4)	Medium (3)	Med-Low (2)	Low (1)
Yield Adequacy (YLD)	Provides appreciably more revenue than existing options and can be guaranteed to persist for long as the project demands or indefinitely.	Provides more revenue than existing options and can be reasonably assured to persist in the long term or as long as the project demands.	Provides revenue comparable to existing options and can be relied upon to persist for the majority of the project duration.	Provides revenue below existing options, but suffices as a supplementary source of funding. Persists only for an intermediate duration.	Provides revenue which is insufficient to support the project either in yield or duration.
Stability (STB)	Revenue is highly consistent and can be empirically modelled with great confidence. It is resilient to technological changes and economic shocks, cyclicalities, and inflation. Revenue stream is low risk and can be easily leveraged.	Revenue is consistent and can be empirically modelled. It is relatively insulated from economic shock and inflation; new technology diminishes yield very gradually, if at all. Revenue stream is moderately low risk and can be leveraged if needed.	Revenue is consistent, predictable, and is relatively stable through all but the most unforeseen technological changes and economic shocks. Exogenous effects cause yield to diminish at a tolerable rate.	Revenue is somewhat erratic, has appreciable correlation with economic cyclicalities and inflation, or is expected to be rendered obsolete by developing technologies.	Revenue which is highly erratic or is indexed to largely unpredictable factors. Changes in economic conditions cause great fluctuations in yield. Existing technologies render the revenue source obsolete.
Implementation and Administration (IMP)	Option can be implemented without obstacles and reach full potential immediately. Administration is not required for the funding source or otherwise has no bearing on the project's ability to move forward.	Option can be implemented with little delay or logistics and reaches full potential quickly. Administration of the funding source is streamlined with the project hierarchy and does not appreciably conflict with project work.	Funding option takes some time and investment in dedicated mechanisms before the full revenue stream is realized, but otherwise can be operated with little inconvenience. Administration cause only small delays in project work.	Funding option requires an appreciable amount of time or dedicated infrastructure to establish or to reach full potential. Communication between project hierarchy and administration is difficult or protracted, creating substantial delays.	Funding option requires a great deal of resources to initiate and maintenance is complex, tedious, and costly. Administration causes great inconveniences for, or even conflicts with, project work.

Criteria	High (5)	Med-High (4)	Medium (3)	Med-Low (2)	Low (1)
Equity (EQT)	Cost burden is distributed proportionally based on both the users' benefit and the user's purchasing power, which the option can differentiate with a high degree of granularity. Optimally, the cost burden is placed on an existing fund or agency and not users at all.	Cost burden is distributed proportionally based on both the users' benefit and with the users' purchasing power, which the option can differentiate broadly by classifying users into strata based on usage and income.	The option is sensitive to users' ability to pay, but ultimately lower income levels must expend a greater share of their purchasing power than higher income levels. Price discrimination is based on traits other than usage (ie. geography, license class, purpose, etc.).	Income level is not a factor and all levels bear the same cost burden, making it such that lower income levels expend a significantly higher share of their purchasing power than higher income levels. There is no price discrimination based on usage.	Cost burden is distributed in such a way that unfairly restricts user access based on income level. Also, it is such that some users incur the majority of the cost burden while others make equal or greater usage at no cost.
Economic Efficiency (ECN)	There is an obvious relationship between the project and the revenue source which empirically correlates a dollar value of cost to a dollar value of benefits. Costs create no market distortions	The relationship between the project and the revenue source can be easily understood, signaling that funds are being used effectively to create improvements. Costs create no market distortions.	There is an indirect relationship between the project and the revenue source, making it less apparent that the funds are, in fact, being applied effectively. Costs cause some deviation in local market patterns.	The relationship between the project and the revenue source is poorly understood, making it difficult to associate improvements with the costs they incur. Costs have significant effects on local market patterns.	There is no relationship between the project and the funding source, thus no apparent correlation between cost and benefit. Costs adversely affect local markets by creating economic barriers or hurting businesses.
Public Acceptance and Feasibility (ACC)	Option is apolitical and not subject to social contention, being universally popular.	Option is politically neutral or otherwise receives political support across the spectrum, as well as being popular.	Option is popular in majority and can be implemented with minimal sociopolitical push-back throughout the lifetime of the project.	Option is presently or expected to be contentious. Sociopolitical popularity cannot be guaranteed throughout the lifetime of the project.	Largely contentious throughout the sociopolitical spectrum. Option is universally unpopular.

3.2a Vehicle Miles Traveled Fee

Current use. Road Usage Charge Program will begin in Oregon July 1, 2015

Estimated fee required to replace the NC motor fuels tax: 1.9 cents/mile (\$290 annually/average driver)

Estimated fee with expected driver behavior change: 2.1 cents/mile (\$292 annually/average driver)

Definition. A vehicle miles traveled (VMT) fee is assessed to drivers based on the amount of miles they have driven (generally a cents per mile charge).

Best-practices. Eleven locations in the United States have used trials, focus groups, and surveys to investigate VMT fees.¹²⁵ On July 1, 2015, Oregon will implement the nation's first VMT fee program. The Road Usage Charge Program will charge 5,000 users 1.5 cents per mile.¹²⁶ Though the program is voluntary and plays an ancillary role in funding Oregon's transportation system, it is viewed as a vital first step to a statewide VMT fee program. California will also start a Road Usage Charge pilot program no later than January 1, 2017.¹²⁷

Implementation considerations. VMT fees are often inaccurately associated with an invasion of privacy resulting from an abundance of misinformation surrounding VMT technology. Today, VMT fees have become associated with tracking through a Geospatial Positioning System (GPS) system. Though GPS tracking can be used, it is not required to assess a VMT fee. Instead, either regular odometer readings or technology, which counts only the total miles traveled (not the locations of travel), can be used to implement such a system.

Building awareness, education, and confronting privacy issues directly is crucial during the implementation stages of a VMT fee program. In Minnesota and Oregon, the American Civil Liberties Union was invited to participate in VMT task forces and elected officials from these states' legislatures were included in VMT fee trials. This participation provided the legislators with intimate knowledge of a VMT fee system and allowed officials to bring their experience and advice to help with the decision-making process.¹²⁸ Drivers also respond favorably to trials. A recent national evaluation of mileage-based user fees found that, prior to the study, more than 60

¹²⁵ Institute for Transportation Research and Education, "Revenue Enhancement Options Study: Synthesis Report" December 03, 2013.

¹²⁶ Oregon Department of Transportation, August 2013, "Road Usage Charge Program (RUCP) Fact Sheet" ODOT, http://www.oregon.gov/ODOT/HWY/RUFPP/docs/RUCP_Facts_Aug2013.pdf

¹²⁷ "SB-1077 Vehicles: Road Usage Charge Pilot Program," http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1077

¹²⁸ Sorenson et. al, 2012, "Mileage-Based User Fees for Transportation Funding – A Primer for State and Local Decision Makers," RAND, http://www.rand.org/content/dam/rand/pubs/tools/TL100/TL104/RAND_TL104.pdf

percent of the participants expressed a negative or neutral view of MBUFs. Following the study, 70 percent of the participants expressed a favorable view.¹²⁹

In 2013, North Carolina collected a total of \$1.82 billion in state motor fuels tax revenue,¹³⁰ where the average North Carolina driver spent approximately \$277 annually in state motor fuels taxes.¹³¹ If North Carolina were to transition from a motor fuels tax to a VMT fee the state could charge a 1.84-cent per mile fee to achieve the same 2013 revenue levels obtained through the state motor fuels tax.¹³² Of the 1.84-cent fee collected, 0.09 cents, or approximately 5 percent, would go toward paying the administration and implementation costs of a VMT program.¹³³ The 1.84-cent fee would equate to each driver paying approximately \$290 per year, or \$13 more than they currently pay with the motor fuels tax mechanism.

The revenue discussion above did not take into any account driver behavior change that would likely result. Even though a VMT system could be established so that drivers would pay nearly the same amount in user fees (the system would require the average driver to pay \$13 more annually for administrative costs), a more direct knowledge of actual travel expenses would influence driving reductions. For example, Oregon's road pricing pilot project resulted in a 12 percent decrease in vehicle miles traveled even though the charge per mile was, on average, equivalent to what a driver would pay for travel through motor fuels taxes.¹³⁴

VMT fees offer a greater degree of cost transparency than the motor fuels tax and other user fees; thus drivers are more inclined to change their travel behavior. Since drivers can better interpret their true transportation costs they may choose to plan better so that they spend less. In the case of a VMT fee, multiple policy objectives are often woven into this one mechanism. For example, many policymakers see a VMT system as a great method to generate revenue and reduce congestion. Assuming Oregon's findings were to apply in North Carolina, a fee of 2.1-cents per mile would be required to collect \$1.82 billion in revenue (with 0.11 cents, or 5 percent, required to pay for administrative costs).

¹²⁹ Paul Hanely and John Kuhl, 2011, "National Evaluation of Mileage-Based Charges for Drivers," Transportation Research Board, <http://trb.metapress.com/content/llq5560865m71256/?genre=article&id=doi%3a10.3141%2f2221-02>

¹³⁰ NCDOT, "2013-14 NCDOT Sources and Uses Chart," <http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>

¹³¹ Calculation was derived from two sources: (1) source above and (2) Federal Highway Administration, "Highway Statistics 2011: Licensed Total Drivers, by Age," Table DL-22. Calculation: \$1.82 billion (source 1) / 6,569,341 drivers (source 2) = \$277 per driver

¹³² Calculations were derived from three sources: (1) NCDOT - see footnote 42, (2) FHWA - see footnote 43, (3) Federal Highway Administration, "Highway Statistics 2011: Functional System Travel - 2011/Annual Vehicle - Miles," Table VM-2. Calculation (\$0.0184) x 15,796 miles x 6,569,341 = \$1.91 billion (revenue with 5% admin cost)

¹³³ Jim Whitty, ODOT's Innovative Partnerships and Alternative Funding Program Manager, conversation with Adrienne Heller, September 30, 2013.

¹³⁴ Atkinson et. al, 2009, "Paying Our Way", National Surface Transportation Infrastructure Financing Commission, http://financecommission.dot.gov/Documents/NSTIF_Commission_Final_Report_Advance%20Copy_Feb09.pdf

If North Carolina were to charge Oregon's Road Usage Charge Program fee of 1.5 cents per mile, and apply it to all North Carolina drivers, this would yield \$1.4 billion in additional revenue for the state.

3.2b Fine-based Fees

Current use in North Carolina. According to the NC DMV, fines from traffic violations can range between \$100-500. Most commonly, speeding tickets average \$150 and North Carolina ranks eighth in the nation regarding most tickets issued.¹³⁵

Definition. Fine-based funding is the application of monies collected from traffic violations to assist with funding infrastructure projects. Generally, these fines are parsed into a variety of uses, including these projects.

Implementation considerations. The elasticity of fine-based funding is not a concern because, as many studies in behavioral psychology have shown, modulating the degree of punishment rarely has any effect on the occurrence of violations.

The yield of fine-based funding is moderate. Revenues from traffic tickets alone, while not specifically known, are estimated to range from \$3.75 billion to \$7.5 billion dollars annually based on average ticket fine amount and number issued each year.¹³⁶ While there is no way to reliably model instances of traffic violations, much less the revenue generated from them, users can fairly reliably be expected to continue breaking the law, as the trend has always been.

Implementation and administration has a high feasibility as this mode of revenue generation is directly tied to the existing punitive system. However, legislative action may be required to ensure revenue from fines is directed to North Carolina's Highway Trust Fund. Equity, on the other hand, is rated very low. With the exception of the interpretation that fines are assessed based on use (in this case abuse) of the transportation system, enforcement is often inconsistent. Many violators will inevitably slip through the system; this translates to some users (violators) bearing the majority of the cost burden while others are able to use at no cost. There are also no concessions in the punitive system for income level, which may be seen as appropriate if it weren't for the myriad of criticisms of discrimination in the way violations are assessed.

Economic efficiency is fairly low as there is little indication of how fines are applied to infrastructure projects; in fact, the practice is to distribute these funds to various public works, the method which for doing so is not well understood. Despite multifaceted criticism, fines are widely accepted as a mechanism of the judicial system, so is here assessed a rating of moderately popular.

¹³⁵ National Motorists Association, "Speeding Tickets By State: Where are Drivers Most Likely to Be Ticketed," July 2010. <http://www.motorists.org/press/speeding-tickets-by-state>

¹³⁶ National Motorists Association, "Traffic Tickets Are Big Business," October 12, 2007, <http://blog.motorists.org/traffic-tickets-are-big-business/>

3.2c Heavy Vehicle Fees

Current use. The federal government charges a fee of \$100 for vehicles ranging from 55,000-75,000lbs and \$550 for vehicles with weights over 75,000lbs. Additionally, four states (KY, NY, OR, NM) impose heavy vehicle fees depending on how many miles these vehicles travel.

Definition. The heavy vehicle fee or tax (HVT) is an annual fee assessed by the federal government on vehicles operating on public highways exceeding 55,000lbs. The taxable weight is determined by adding the unloaded weight of the vehicle and the maximum load customarily carried by the trailer.

The fees charged by KY, NY, OR, and NM are known as the weight-mile taxes, and are charged every month or quarter-year based on the combined vehicle/load weight and miles drive.

Implementation considerations. Oregon's weight-mile tax generates \$300 million in revenue each year;¹³⁷ however its primary flaw is that it relies on self-reporting. Thus the four states that do impose this fee are often subject to underreporting. A Delcan Corporation study (2011) revealed that New York state loses \$150 million annually as a result of truck drivers underreporting the mileage and weight of their vehicles.¹³⁸ In a commercial context, GPS technology that could be used to prevent underreporting and may be viewed more favorably than in a civilian context. For example, GPS tracking would provide an extra layer of insurance for freight carriers moving valuable goods.

Currently, the revenue generated by the weight-mile tax is considered moderate yield. If North Carolina were to generate similar revenues to Oregon through its own weight-mile tax, it would fund about 7 percent of North Carolina's current transportation budget. If better reporting technology were to become widely used, then these revenues would be substantially higher.

States that do not assess a weight-mile tax on heavy vehicles may apply fees through tolling or fuel consumption. North Carolina assesses fees on heavy vehicles through tolling along the I-95 corridor based on axles: three-axle vehicles pay twice as much as two-axle vehicles at each toll, and four-axle vehicles pay twice as much as three-axes.¹³⁹

Given similar demand for and consistency of usage of the I-95 corridor, it can be reasonably assumed that elasticities between vehicle classes will conform to similar trends; a 10 percent increase in tolling will result in a reduction of usage between 1.0 and 4.5 percent.¹⁴⁰ Other studies

¹³⁷ Ferrol Robinson, David Coyle, Gerard McCullough, 2012, "Potential Benefits of Mileage-Based User Fees to the Freight Industry and Industry Concerns," *Minnesota Department of Transportation*, <http://ntl.bts.gov/lib/47000/47800/47894/2012-19.pdf>

¹³⁸ Government Accountability Office, 2012, "Highway Trust Fund: Pilot Program Could Help Determine the Viability of Mileage Fees for Certain Vehicles," GAO, <http://www.gao.gov/assets/660/650863.pdf>

¹³⁹ "Toll Operations." *NC Department of Transportation*, 2014. <http://www.ncdot.gov/turnpike/tolls/>

¹⁴⁰ Litman, Todd. "Local Funding Options for Public Transportation." *Victoria Transport Policy Institute*: May 22, 2014, <http://www.vtpi.org/tranfunding.pdf>

have determined other means to assess fees to heavy vehicles, namely through diesel and mileage taxes. It was determined that the optimal taxes would be \$0.69 per gallon of diesel and between \$0.07 and \$0.20 per mile depending on the degree of urbanization.¹⁴¹

The feasibility of implementing HVTs depends on which mechanism is under consideration. Tolling based on number of axles is already widely practiced, and can thus be reasonably adjusted. Weight-mile taxes, on the other hand, may require more effort to implement. If using a self-reported weight-mile system, there will likely be less opposition than using a global positioning system (GPS). However, the opposition to GPS may be mitigated by demonstrating the economic benefits of added security for commodity shipments.

Weight-mile taxes may impact freight companies that move raw materials more so than companies that move manufactured goods. Raw materials likely weigh more and are worth less than manufactured goods, thus a weight-mile tax would account for a greater percentage of the profit margin of a company transporting raw materials.

¹⁴¹ Parry, Ian. "How Should Heavy-Duty Trucks Be Taxed?" *Resources for the Future*, 2006.
<http://www.rff.org/Documents/RFF-DP-06-23.pdf>

3.2d Severance Fees

Current use. Thirty-one states currently impose severance fees or taxes on natural resource extraction: AL, AK, AZ, AR, CA, CO, FL, ID, IN, KS, KY, LA, MI, MS, MT, NE, NV, NH, NM, NC, ND, OH, OK, OR, SD, TN, TX, UT, WV, WI, WY.

Definition. Severance Fees or Taxes are charges assessed on the extraction of natural resources, commonly oil, natural gas, and coal. It is either levied as a percentage of the sale value of the resource or as a charge per unit of resource extracted. The revenue from these charges typically go to a common state fund and is parsed out to various projects. In North Carolina, severance fees are, at maximum, five mills (one-thousandths of a dollar) per barrel of oil and 0.5 mills per 1,000 cubic feet of natural gas.¹⁴²

Implementation considerations. The elasticity of severance taxes is inelastic, that is to say that marginal changes to the tax rate or fee magnitude do not appreciably effect the rate at which resources are extracted or the need to transport them, otherwise the usage of transportation infrastructure.¹⁴³ This is likely due to the large demand for natural resources in the energy sector and the influence held by the companies therein.

Yield is considered moderately high, exceeding \$11B nationally in 2010¹⁴⁴ and at one point being estimated to provide \$14M in revenue for North Carolina.¹⁴⁵ Stability is also considered moderately high due to the consistent and predictable nature of the demand for oil and natural gas.

Implementation and administration is considered moderate as it is common practice to charge severance fees for natural resource extraction, but it has not been expanded to other forms of extraction in North Carolina outside of oil and gas and it is not well known the mechanism by which the funds can be diverted to improving transportation infrastructure. Equity is considered moderately high because it is a tax or fee which is largely divorces from the public, impacting primarily large industrial companies. The charge is directly correlated to the amount extracted and by extension the usage of roadways in transporting materials.

Economic efficiency is fairly low as there are many degrees of separation between the charges being assessed and their impact on improving infrastructure, and in fact it is uncertain how much of the general funds are diverted to these projects. Acceptability is moderate as while it can be expected to be popular with the public, many politically influential companies have already expressed their disapproval of this funding method.

¹⁴²Pless, Jacquelyn. "Oil and Gas Severance Taxes: States Work to Alleviate Fiscal Pressures Amid the Natural Gas Boom." *National Conference of State Legislators*, February 2012.

¹⁴³ Kleckley, James; Olson, Kent. "Severance Tax Stability." *National Tax Journal*, March 1989.

¹⁴⁴ Pless, Jacquelyn. "Oil and Gas Severance Taxes: States Work to Alleviate Fiscal Pressures Amid the Natural Gas Boom." *National Conference of State Legislators*, February 2012.

¹⁴⁵ Siceloff, Bruce. "Severance Tax or Depletion Allowance Repeal?" *North Carolina Center for Public Policy Research*, September 1981.

3.2e Vehicle Title, Registration, Vanity Plate Fees

Current use. In North Carolina the fee for vehicle title is \$40 and the annual fee for registration can range from \$28 to \$52 depending on the class or size of the vehicle. Vanity plate fees are \$30 annually in North Carolina.

In comparison, the fees for titling in neighboring states of South Carolina, Virginia, and Tennessee are \$15, \$10, and \$5.50 respectively, significantly lower than in NC. Vehicle registration ranges from \$24 to \$100 in SC and \$28.75 to \$51.75 in VA depending on vehicle class or size, and is a flat \$21.50 in TN, for the most part on par with fees in North Carolina. Specialty or vanity plates in SC, VA, and TN are between \$20 and \$70 biannually, \$10 annually, and \$35 to \$70 annually respectively. While highly variable, NC vanity plate fees are about average in comparison (see footnote of Exhibit 27 for sources used in this paragraph).

Exhibit 27

Annual Title, Registration, and Vanity Plate Costs

State	Vehicle Title	Registration	Vanity Plate
North Carolina	\$40	\$28-\$52	\$30
South Carolina	\$15	\$24-\$100	\$40-\$140
Tennessee	\$5.50	\$21.50	\$35-\$70
Virginia	\$10	\$28.75-\$51.50	\$10

See footnote¹⁴⁶ for sources used in this table

Definition. Vehicle title and registration fees are costs associated with officiating ownership of a vehicle. Vanity plate fees are costs associated with registering a custom plate.

Implementation considerations. The elasticity of title and registration fees is inelastic, that is to say changes in these ownership costs do not create an appreciable change in vehicle ownership and use. These costs are fixed and a requisite to participate in the transportation network.¹⁴⁷ The

¹⁴⁶ North Carolina Sources: NCDMV, "How to Title and Register a Vehicle," <http://www.ncdot.gov/dmv/vehicle/title/>, DMV.org, "Car Registration In North Carolina," <http://www.dmv.org/nc-north-carolina/car-registration.php>;

South Carolina Sources: South Carolina Department of Motor Vehicles, "Title and Registration," <http://www.scdmsonline.com/dmvnew/default.aspx?n=titleandreg>, South Carolina Department of Motor Vehicles, "Plate Galleries," <http://www.scdmsonline.com/dmvnew/PlateGallery.aspx?q=All>;

Virginia Sources: Virginia Department of Motor Vehicles, "DMV Fees," <http://www.dmv.state.va.us/webdoc/pdf/dmv201.pdf>, Virginia Department of Motor Vehicles, "Create a Plate," <https://www.dmv.virginia.gov/vehicles/#plates.asp>;

Tennessee Sources: Tennessee Department of Revenue, "Vehicle Title & Registration Reference Guide," <http://www.tn.gov/revenue/vehicle/referenceguide/titleregfees.pdf>, Tennessee Department of Revenue, "Specialty License Plates," <http://www.tn.gov/revenue/vehicle/licenseplates/specialty.shtml>

¹⁴⁷ Litman, Todd. "Local Funding Options for Public Transportation." *Victoria Transport Policy Institute*: May 2014, <http://www.vtpi.org/tranfund.pdf>

number of vanity plates, on the other hand, was shown to decrease by 0.04 percent for every \$1 increase in the annual fee.¹⁴⁸

The combined yield from titles and registration is considered moderately high, exceeding \$600 million in 2007 in North Carolina and being only slightly under \$600 million in 2010. It is considered highly stable due to heavy reliance on personal vehicle transportation and this factor's correlation to population and income growth.¹⁴⁹

Implementation and administration is considered high as it is a part of the fundamental process by which the transportation network and vehicle ownership is managed. Equity is considered very low as all users, regardless of income level, are required to pay the same fees and there are no concessions for those of lower income.¹⁵⁰

Economic efficiency is also fairly low, although there is an indication that these fees go towards the transportation network. However, there are no signals as to where the funds are being applied. Further, one is unable to measure the usefulness of the pricing being assessed towards improving transportation infrastructure.

¹⁴⁸ Craft, Erik. "The Demand for Vanity (Plates): Elasticities, Net Revenue Maximization, and Deadweight Loss." *Contemporary Economic Policy*, July 2008, <http://onlinelibrary.wiley.com/doi/10.1093/cep/20.2.133/pdf>

¹⁴⁹ "North Carolina I-95 Economic Assessment." *Cambridge Systematics, Inc.*: June 2013, http://www.driving95.com/assets/pdfs/task-5_tourism_industry_overview.pdf

¹⁵⁰ Ibid

3.2f Highway Use Tax

Current use in North Carolina: A Highway Use Tax (HUT) of 3 percent is levied on vehicle owners, lessors, and renters during a vehicle's titling process.¹⁵¹

Use in Other States. Most states charge a standard sales and use tax rate on the purchase of motor vehicles. However, like North Carolina, both Kentucky and North Dakota replace their state sales and use tax with a transportation-specific tax when registering a vehicle (see Exhibit 28). Additionally, some states specify the destination of revenue generated by sales and use taxes on motor vehicles. Of Vermont's 6 percent purchase and use fee, four percent is allocated to the Transportation Fund.¹⁵² Much of Virginia's sales and use tax on motor vehicles goes towards a special fund within the Commonwealth Transportation Fund for highway reconstruction and maintenance and the regulation of traffic.¹⁵³

Exhibit 28
Taxes Assessed on Vehicles

State	Name of Tax	Percentage
North Carolina	Highway Use Tax	3%
Kentucky ¹⁵⁴	Motor Vehicle Usage Tax	6%
North Dakota ¹⁵⁵	Motor Vehicle Excise Tax	5%

Definition. The HUT is a user-fee applied to every newly titled vehicle. It is imposed for the privilege of using highways in the state. Most of the revenue collected from the HUT goes to the North Carolina Highway Trust Fund; however, revenues collected for short-term vehicle leases go to the North Carolina General Fund.¹⁵⁶

Implementation considerations. In 2013, North Carolina collected \$550 million in HUT revenue, accounting for 12.5 percent of the state's total transportation budget.¹⁵⁷ Two legislative actions could result in additional revenue generation if applied to the Highway Use Tax. If (1) HUT revenue collected from short-term vehicle leases were transferred from North Carolina's General Fund to

¹⁵¹ For short-term vehicle leases, a rate of 8 percent is levied and this revenue collected and goes into the North Carolina General Fund. All other HUT revenues go into the North Carolina Highway Trust Fund.

¹⁵² "Vermont Transportation Funding Options Section 40 Act 153 (2012)," 2013. *Section 40 Committee on Transportation Funding*. <http://www.leg.state.vt.us/reports/2013ExternalReports/292520.pdf>

¹⁵³ Virginia DMV: Motor Vehicle Sales and Use Tax, <https://www.dmv.virginia.gov/vehicles/#sut.asp>

¹⁵⁴ Kentucky Department of Revenue: Motor Vehicle Usage Tax, <http://revenue.ky.gov/business/motorvehicleusage.htm>

¹⁵⁵ North Dakota Tax: Sales and Use, <http://www.nd.gov/tax/salesanduse/>

¹⁵⁶ North Carolina General Statutes, Article 5A, "North Carolina Highway Use Tax," http://www.ncleg.net/EnactedLegislation/Statutes/PDF/ByArticle/Chapter_105/Article_5A.pdf

¹⁵⁷ NCDOT, "2013-14 NCDOT Sources and Uses Chart," <http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>

the Highway Trust Fund and (2) HUT was increased from 3 to 4 percent, North Carolina would have an additional \$220 million of transportation funds each year (\$50 million from transfers, \$170 million from new revenue).¹⁵⁸

Additional HUT revenues discussed above did not take into account how motorist behavior would change as a result of price increases. In actuality, an increase of the HUT from 3 to 4 percent may result in a decrease in driving of 0.24 percent in the short-term and 0.34 percent over the long-term.¹⁵⁹ Changes in driver behavior have very little effect on transportation revenue, where short-term and long-term revenues, incorporating behavior change, would likely remain around \$170 million.

¹⁵⁸ ITRE "Revenue Enhancement Options Study: Synthesis Report" December 03, 2013.

¹⁵⁹ "Changing North American Vehicle-Travel Price Sensitivities: Implications for Transport Energy Policy." *Transport Policy*, 28 (2013) 2-10.) So an increase of 1 percent in the HUT corresponds to a decrease of 0.24 percent in the short-term and 0.34 percent over the long-term.

3.2g State Motor Fuels Tax

Current use in North Carolina: North Carolina is one of 12 states that has indexed its motor fuels tax; however, the tax is subject to a cap which limits its revenue yield.

Definition. A motor fuels tax index ensures that the tax's purchasing power does not erode relative to inflation. Thus as the general cost of goods increases slightly from one year to the next, the motor fuels tax keeps pace with this general increase. In North Carolina, motorists pay a fixed and variable component for the motor fuels tax (17.5 cents per gallon plus 7 percent of the wholesale price of petroleum), which helps motor fuels tax receipts keep pace with inflation.¹⁶⁰ Within the last decade, the motor fuels tax has been subject to various caps, which serve as a maximum of what can be taxed per gallon. Since 2007, a cumulative revenue loss of over \$559 million has resulted from capping policies in North Carolina.¹⁶¹

Implementation considerations. Though North Carolina's motor fuels tax receipts have paced fairly well with inflation (Exhibit 29), the federal government's motor fuels tax receipts have not. The rate of the federal motor fuels tax has not been raised since 1993, and, as a result, its purchasing power has fallen by 40 percent over this time period (see Exhibit 29). North Carolina has historically relied on federal aid for a significant portion of its transportation budget (27.2 percent in fiscal year 2013-2014); however, it is becoming increasingly risky to do so. Federal aid commitments have become increasingly dependent on transfers from the U.S. General Fund (\$52.1 billion since 2008).¹⁶² In May 2015, the Federal Highway Trust Fund is projected to become insolvent¹⁶³ and at this point there is a real possibility that large cuts in federal aid will result. In order to sustain its transportation system, North Carolina may consider removing the motor fuels tax cap or changing its tax structure.

In 2013, North Carolina collected a total of \$1.82 billion in motor fuels tax revenue, where the average North Carolina driver spent approximately \$277 annually in state motor fuel taxes.¹⁶⁴ If North Carolina were to raise the fixed component of its motor fuels tax by five cents it would generate approximately \$2.1 billion in revenue with each driver spending \$314 annually in state motor fuel taxes.

¹⁶⁰ North Carolina Department of Revenue, "Motor Fuels Tax Rates." <http://www.dornrc.com/taxes/motor/rates.html>

¹⁶¹ NCDOT, 2013 "Historical Information: NC Motor Fuels Tax."

¹⁶² Janet Oakley, "Outlook for the Federal Highway Trust Fund," AASHTO, January 9, 2014.

http://www.naco.org/about/leadership/nccae/Documents/Oakley-Presentation-Slides_AASHTO_2014.pdf

¹⁶³ CBS News, "House Approves Highway Trust Fund Patch," July 15, 2014, <http://www.cbsnews.com/news/house-approves-highway-trust-fund-patch/>

¹⁶⁴ NCDOT, "2013-14 NCDOT Sources and Uses Chart,"

<http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>

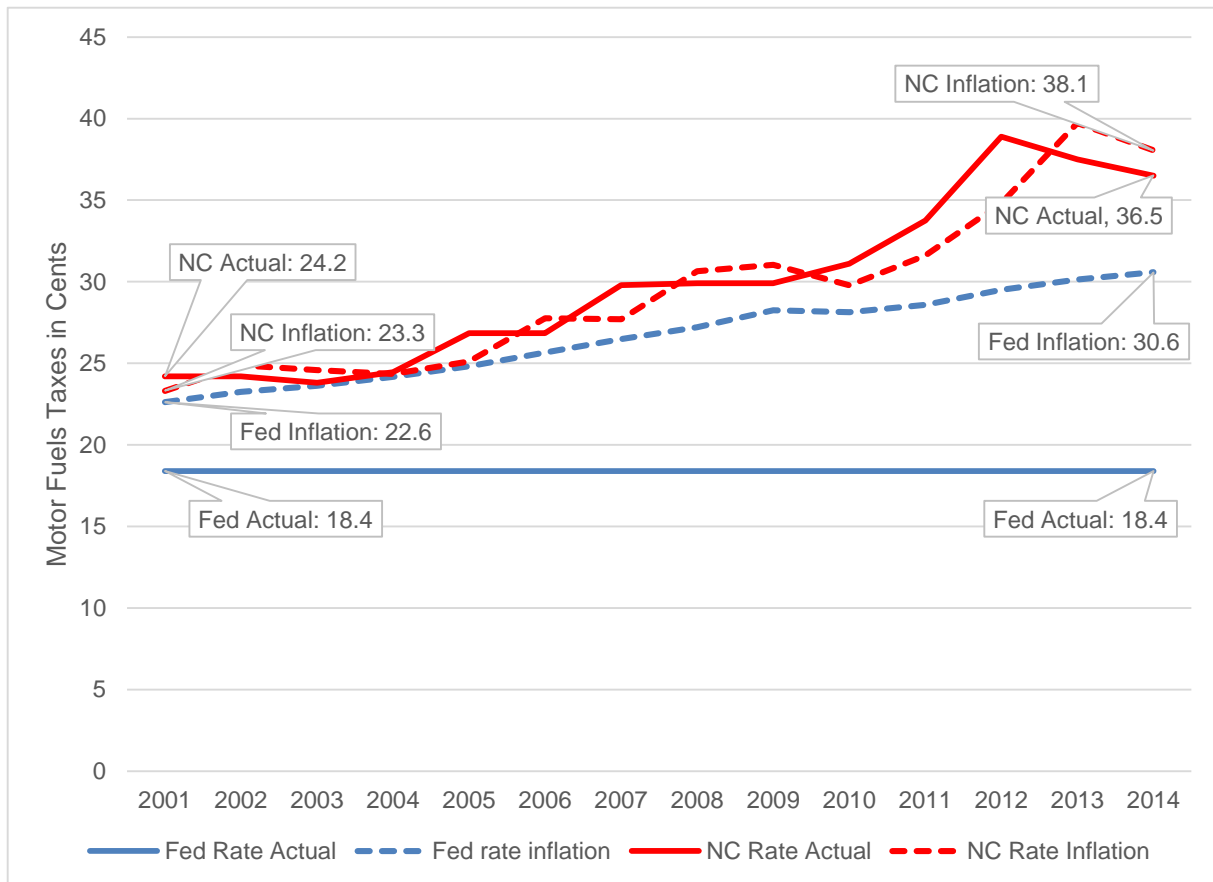
Exhibit 29**State and Federal Motor Fuels Taxes Relative to Inflation**

Figure Sources: (1) Coin News Media Group LLC, (2) NCDOR, "Motor Fuels Tax Rates," (3) National Surface Transportation Infrastructure Financing Commission

The revenue calculation above did not take into account price elasticity of demand effects on driver behavior or fuel economy impacts on tax receipts. If the motor fuels tax were raised 5 cents, a corresponding decrease in driving of 3.4 percent would occur in the short-term with a decrease of 4.4 in the long-term.¹⁶⁵ Revenue generated by the motor fuels tax would be approximately \$1.99 billion in the short-term and \$1.97 billion in the long-term.¹⁶⁶

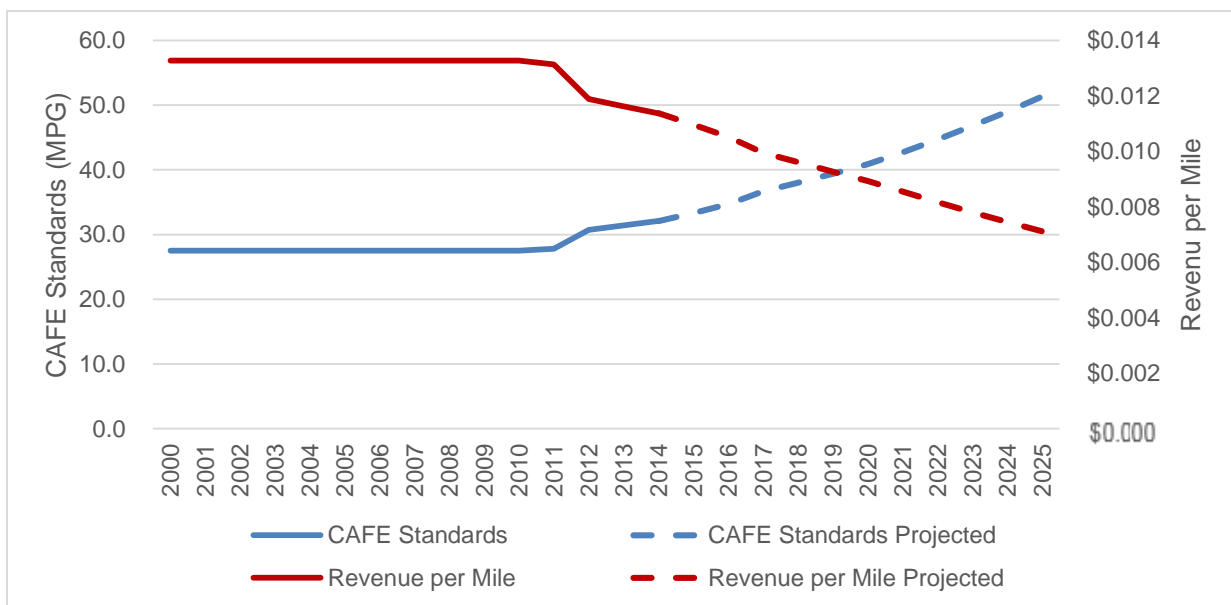
In recent years, substantial changes were mandated to improve the Corporate Average Fuel Economy (CAFE) standards of vehicles in the United States. The minimum CAFE standard for domestically manufactured passenger cars will increase from 27.5 miles per gallon (mpg) to 51.3

¹⁶⁵ "Changing North American Vehicle-Travel Price Sensitivities: Implications for Transport Energy Policy." *Transport Policy*, 28 (2013) 2-10.) So an increase of 13.3 percent in the motor fuels tax corresponds to a decrease of 3.1 percent in the short-term and 4.4 percent over the long-term.

¹⁶⁶ Ibid

mpg over the period of 2010-2025.¹⁶⁷ Though these changes offer environmental and political benefits in the form of reduced auto emissions and greater American fuel independence, they negatively impact transportation revenue obtained through motor fuel tax receipts. Exhibit 30 demonstrates how fuel economy improvements impact North Carolina's transportation revenues. Using North Carolina's current motor fuels tax rate of \$0.365 per gallon,¹⁶⁸ it can be determined that a light duty vehicle meeting CAFE standards of 27.5 mpg (2010 requirement) generates 1.3 cents per mile in transportation revenue while a vehicle operating at 40.9 mpg (2020 requirement) generates 0.9 cents per mile.

Exhibit 30
Revenue based on Vehicle Fuel Economy



Source: Derived from Environmental Protection Agency, October 2012.

¹⁶⁷ Environmental Protection Agency, "Table I-3-Minimum Standard for Domestically Manufactured Passenger Cars (MPG)," October, 2012. <http://www.nhtsa.gov/fuel-economy> (see: "DOT and EPA Establish CAFE and GHG Emissions Standards for Model Years 2017 and Beyond: Final Rule (Federal Register version)")

¹⁶⁸ North Carolina Department of Revenue, "Motor Fuels Tax Rates," June 18, 2014. <http://www.dor.state.nc.us/taxes/motor/rates.html>

3.2h Flat-rate Tolling

Current use. Tolling is used in 39 states: AL, CA, CO, DE, FL, GA, IL, IN, KS, LA, ME, MD, MA, MN, NH, NJ, NY, NC, OH, OK, PA, PR, SC, TX, UT, VA, WA, WV. In North Carolina, tolling is presently imposed on the Triangle Expressway (NC147/NC540).

Definition. Flat-rate tolling is a fee levied to users of a specific length of highway. It requires users to pay or prepay, generally on the order of one dollar, upon entry for, ideally, the guarantee of free-flow traffic conditions through a given transit corridor. Depending on the length of the corridor, there may be multiple stations to assess tolls in relation to the amount of usage.

Implementation considerations. Users have been found to be relatively sensitive to tolling with research finding a 10 percent increase in tolls reduces usage from 1.0 to 4.5 percent. Elasticity is higher still in roadways with fewer essential trips, more alternatives, or lower congestion levels.¹⁶⁹

Yield is considered to be fairly high. The currently operating Triangle Expressway netted \$9.9 million in toll revenue in fiscal year 2014.¹⁷⁰ Tolling could potentially generate \$250 million for North Carolina in 2020, increasing to \$928 million in 2040.¹⁷¹ The I-95 corridor has a highly consistent traffic stream and is depended upon greatly by individuals associated with the regional universities and the Research Triangle Parkway, so the stability of existing tolling is considered high. New developments along I-95 are considered reasonable candidates for expanded tolling, given this high consistency.¹⁷²

Implementation is graded at medium-low because of the amount of physical infrastructure required to establish tolling. While in the case of North Carolina, expansions to I-95 will likely include additional tolling facilities upon opening, the additional construction and planning of tolling logistics still requires additional time and resources. Once the toll is in place, however, it is easy to manage and, with automated gates and prepaid fast lanes, can essentially run itself. Equity is on the low end as the toll does not make any concessions at all for the user's ability to pay, as it is a flat fee for any passers-through. It also makes only moderate attempts to modulate fees based on usage.¹⁷³

In many instances, the success of tolling depends on what party receives its toll revenue. Proposals succeed not only because they benefit the public interest, but also because they benefit particular interests, and these interests organize to champion the policies. It is keenly advantageous to offer

¹⁶⁹ Litman, Todd. "Local Funding Options for Public Transportation." *Victoria Transport Policy Institute*: May 2014, <http://www.vtpi.org/tranfund.pdf>.

¹⁷⁰ North Carolina Turnpike Authority, "Financial Statements," <http://www.ncdot.gov/turnpike/download/2014NCTAAuditedFncIStatmnts.pdf>

¹⁷¹ "North Carolina I-95 Economic Assessment." *Cambridge Systematics, Inc.*: June 2013, http://www.driving95.com/assets/pdfs/task-5_tourism_industry_overview.pdf

¹⁷² Ibid

¹⁷³ "Toll Operations," *NC Department of Transportation*, 2014, <http://www.ncdot.gov/turnpike/tolls/>

toll revenue as a prize that officials can use for the most important projects in their municipalities.¹⁷⁴

¹⁷⁴ King, David, Michael Manville, and Donald Shoup. 2007. "The Political Calculus of Congestion Pricing," *Transport Policy*, Vol. 14, p.111-123. <http://shoup.bol.ucla.edu/PoliticalCalculus.pdf>

3.2i High-Occupancy Toll Lanes

Current use. High occupancy toll lanes are currently in place in 10 states: CA, CO, FL, GA, MD, MN, TX, UT, VA, WA. Tolls charges range from \$1 to \$3.¹⁷⁵

Definition. High Occupancy Toll (HOT) lanes are special lanes designated for vehicles transporting multiple individuals. Specifically, they impose a charge on single-occupant vehicles to use an uncongested lane while transit and carpooling vehicles are able to use it for free.

Implementation considerations. A study of HOT lanes in Minnesota found a positive elasticity between toll pricing and HOT lane usage, specifically that a 10 percent increase in toll price resulted in a 3 to 85 percent increase in usage. This was hypothesized to reflect the user's judgment that a higher toll indicated greater time-savings.¹⁷⁶

A study of planned HOV/HOT lane implementation throughout the Charlotte-Mecklenburg, NC region, specifically the I-85 and I-77 corridors and the I-485 loop, project that by 2030 full implementation would result in time savings of about 0.37 minutes per mile, on average, over an average through-trip distance of about 46 miles; this equates to an average of about 17 minutes saved per trip.¹⁷⁷ The same study projected, for 2030, nearly 100 percent of free flow conditions in HOT lanes compared to 60 percent in general purpose lanes, and double the number of persons served per hour by HOT lanes compared to general purpose lanes.¹⁷⁸

Capital costs for I-85/I-77 HOT lane projects are estimated to be between \$3.2 billion and \$6 billion for the entire regional network, but revenue generation by 2030 is projected to be \$300 million annually under revenue maximizing conditions and about half of that under travel time minimization conditions.¹⁷⁹

Implementation and administration considerations are similar to those for traditional tolling in that physical infrastructure must be in place to support collection. Costs can be reduced through HOV-to-HOT conversions, as the necessary infrastructure is already in place.¹⁸⁰

Equity impacts depend to a large extent on the availability of public transit in HOT lane corridors. If public transportation is available, individuals that cannot afford to pay HOT lane tolls will have a viable alternative for travel. If public transportation is not available through HOT lane corridors, then equity is lower because, the congestive benefits these lanes provide are more readily

¹⁷⁵ "State Strategies for 21st Century Transportation Solutions." *National Conference of State Legislators*, July 2012, <http://www.ncsl.org/documents/transportation/on-the-move.pdf>

¹⁷⁶ Janson, Michael; Levinson, David. "HOT or Not: Driver Elasticity to Price on MnPASS HOT Lanes." University of Minnesota, 2013, <http://nexus.umn.edu/papers/HOTorNOT.pdf>

¹⁷⁷ "Fast Lanes: Charlotte Region Fast Lanes Study." *Charlotte DOT, NCDOT, SCDOT*, July 2009. [http://www.charmeck.org/fastlanes/PDFs/FinalReport\(2009_July\).pdf](http://www.charmeck.org/fastlanes/PDFs/FinalReport(2009_July).pdf)

¹⁷⁸ Ibid

¹⁷⁹ Ibid

¹⁸⁰ Ibid

available to drivers of a higher socioeconomic status.¹⁸¹ However, HOT lanes still offer less of an equity impact than many other revenue options because they operate alongside non-tolled facilities that all drivers can utilize.

Economic efficiency is high because there is a very clear, and appealing product being purchased by users. The environmental benefits of encouraging higher occupancy transportation lead HOT lanes to be popular, but this is diminished by criticisms of higher impact to low-income levels.¹⁸²

¹⁸¹ "Fast Lanes: Charlotte Region Fast Lanes Study." *Charlotte DOT, NCDOT, SCDOT*, July 2009.

[http://www.charmeck.org/fastlanes/PDFs/FinalReport\(2009_July\).pdf](http://www.charmeck.org/fastlanes/PDFs/FinalReport(2009_July).pdf)

¹⁸² "Statewide Transportation Needs Assessment Revenue Report." *California Transportation Commission*, 2013, http://www.catc.ca.gov/reports/2012NeedsAssess/08162012/08162012_finalagenda.pdf

3.2j Cordon Pricing (Priced Zones)

Current use: Approximately 12 international locations use cordon pricing with the most widespread use in England, Sweden, and Singapore.

Definition. Cordon pricing (also known as area or zone pricing) involves charging drivers to access a central business district through entry tolls. Cordon pricing manages congestion through a system of variable toll charges. During morning and evening peak periods, toll charges are higher to reduce the willingness of drivers to pay for entry into a specific cordon. This, in turn, manages traffic by decreasing the number of vehicles in congestion-prone areas.

Implementation considerations. Cordon pricing is primarily a tool for congestion management; however, it can also generate significant revenue. Revenues of approximately \$237 million in London, \$116 million in Stockholm and \$54 million in Singapore are generated each year from these regions' respective pricing systems.¹⁸³ San Francisco County, with a population of 825,000, is in the planning stages of implementing cordon pricing. The San Francisco County Transportation Authority predicts that it would net \$60-80 million annually and reduce peak-period trips by 12 percent in the region, if it were to implement a \$3 peak-period cordon charge.¹⁸⁴ With annual congestion costs reaching \$898 million, \$502 million, and \$465 million in Charlotte, Raleigh-Durham, and the Triad respectively,¹⁸⁵ cordon pricing could help these regions manage traffic.

Cordon pricing is most suitable for urban areas that are already equipped with robust alternatives to driving. Since the primary objective of cordon pricing is to reduce congestion through the reduction of automobile usage, commuting alternatives are essential. In urban areas where viable alternatives exist, extensive trial periods, education, and strong leadership are required to build trust and overcome initial resistance from residents living in the region. Stockholm's congestion tax and London's congestion charge had initial approval ratings of 25 percent and 40 percent, respectively; however, after public outreach, a trial period, and program implementation, approval ratings grew to over 50 percent in both cities.¹⁸⁶

¹⁸³ Atkinson et. al, 2009, "Paying Our Way", National Surface Transportation Infrastructure Financing Commission,

http://financecommission.dot.gov/Documents/NSTIF_Commission_Final_Report_Advance%20Copy_Feb09.pdf

¹⁸⁴ San Francisco County Transportation Authority, 2010, "San Francisco Mobility, Access, and Pricing Study." http://www.sfcta.org/sites/default/files/content/Planning/CongestionPricingFeasibilityStudy/PDFs/mapsfinalrpt_ta-board_2010-12-14.pdf

¹⁸⁵ TRIP, "North Carolina Transportation By the Numbers: Meeting the State's Need for Safe and Efficient Mobility." March 2014.

¹⁸⁶ Arnold et al. "Reducing Congestion and Funding Transportation Using Road Pricing in Europe and Singapore," FHWA December 2010. <http://international.fhwa.dot.gov/pubs/pl10030/pl10030.pdf>

3.2k Statewide Sales Tax

Current use. In the last two years five states (AK, GA, MA, SC, VA) have had sales tax measures that direct generated revenues to transportation.

Definition. Sales taxes are taxes imposed by federal and state governments on retail goods and services as a percentage of the purchase price. These taxes are collected by the retailer and passed on to the state. In this discussion, “sales tax” does not include selective taxes that include gasoline, alcohol, tobacco, and other selectively taxed goods.

Implementation Considerations. As user fee tax systems have eroded, cities, counties, and transit districts have increasingly turned to local option transportation taxes over the last 40 years.¹⁸⁷ Besides state borrowing, the most rapidly-growing category of transportation spending is sales tax.¹⁸⁸ These taxes may be popular at a local level in part because they are more flexible than gasoline taxes, can fund local transit operations, and can generate a large amount of revenue with even a small tax increase.¹⁸⁹ However, the use of sales tax can be problematic. First, it is a regressive tax, and disproportionately affects low-income individuals. Second, implementing a sales tax increase with voter approval often requires state and local agencies to highlight programs and projects for voter approval, representing a significant change in transportation programming. (This could result in highly necessary projects being left unfunded, if they prove to be politically unpopular.) Finally, because sales taxes are not a user fee, they do not encourage the most efficient use of transportation infrastructure.

Though sales tax increases are regressive, not all proposals are created equal. As the table above shows, states like Arkansas and Virginia have chosen to exclude certain items from transportation-directed local sales tax increases, such as food and medicine. At the local level, some state governments have taken care to ensure that some share of new revenue is dedicated to transit and other forms of transportation favored by low-income users, maintain a high level of accountability for projects (including performance measures and coordinated land use planning), and ensuring that projects reflect the priorities of voters.¹⁹⁰

¹⁸⁷ Goldman et. al, 2013, “A Quiet Revolution in Transportation Finance: The Rise of Local Option Transportation Taxes,” Todd Goldman and Martin Wachs, *Transportation Quarterly* 57 (1), 19-32. <http://www.uctc.net/papers/644.pdf>

¹⁸⁸ Ernst et. al, November 2002, “Measuring Up: The Trend toward Voter-Approved Transportation Funding,” *Surface Transportation Policy Project*, http://transact.org/wp-content/uploads/2014/04/Measuring_Up-2002.pdf

¹⁸⁹ Wachs, Martin, 2003, “Local Option Transportation Taxes: Devolution as Revolution,” *Access*, <http://www.uctc.net/access/22/Access%2022%20-%2002%20-%20Local%20Option%20Transportation%20Taxes.pdf>

¹⁹⁰ Ernst et. al, November 2002, “Measuring Up: The Trend toward Voter-Approved Transportation Funding,” Michelle Ernst, James Corless, and Kevin McCarty, *Surface Transportation Policy Project*, http://transact.org/wp-content/uploads/2014/04/Measuring_Up-2002.pdf

Exhibit 31**Sales Tax Measures Enacted Recently**

State	Details	Year	Sunset	Expected revenue*
Arkansas ¹⁹¹	Voters approved 1/2 cent increase in statewide sales tax (excluding medicine, groceries, and gasoline). The sales tax will be used for a one-time bond issue.	2012	10 years	\$1.3B total
Georgia ¹⁹²	Voters in three out of twelve voting regions approved a one cent increase in sales tax to fund a list of regional and local transportation projects. The tax affects and benefits only 46 of 159 counties in the state.	2012	10 years	\$1.8B total
Massachusetts ¹⁹³	State legislature redirected all proceeds from vehicle sales tax to transportation.	2013	indefinite	\$415M annually
South Carolina ¹⁹⁴	State legislature redirected a portion of vehicle sales tax to road maintenance.	2013	indefinite	\$82.8M annually
Virginia ¹⁹⁵	State legislature redirected 0.175% of existing sales taxes redirected to transportation, increased sales tax on nonfood merchandise by 0.3%, and enacted additional local taxes for Northern Virginia and Hampton Roads. The taxes will be phased in over a five-year period.	2013	indefinite	\$3.5B over five years; includes new local taxes

*In the case of omnibus legislation, only expected revenue from sales tax is included

Sales tax is subject to the approval of state and local constituents, whether put forward by general referendum or by the state legislature. On August of 2014, voters in Missouri rejected a 0.75 percent sales tax increase that would have supported a broad range of transportation projects, including roads and bridges. Support for the bill varied widely, and some speculate that the bill failed in part as a result of anti-tax sentiment and lack of support from the Missouri Governor.¹⁹⁶ Sales tax referenda must have strong coalitions of support in order to pass; other important factors include strong voter turnout, specific lists of transportation projects, support for multimodal

¹⁹¹ Arkansas.gov, July 11 2013, "Half-cent Sales Tax Increase to Fund Highway Improvements," Arkansas Senate, http://www.arkansas.gov/senate/newsroom/index.php?do:newsDetail=1&news_id=420

¹⁹² Associated Press, December 22 2012, "Transportation tax to kick in for 46 Ga. Counties," *Athens Banner-Herald*, <http://onlineathens.com/local-news/2012-12-22/transportation-tax-kick-46-ga-counties>

¹⁹³ Transportation for Massachusetts, 2013, "Summary of Transportation Bill (H3535)" <http://www.t4ma.org/site/wp-content/uploads/T4MA-Summary-of-H3535.pdf>

¹⁹⁴ Office of Research and Constituent Services, March 19 2013, "House Week in Review," *South Carolina House of Representatives*, <http://www.scstatehouse.gov/reports/hupdate/lu3010.htm>

¹⁹⁵ Stosch, Walter, March 1, 2013, "Memo: Transportation Conference Report Overview," *Commonwealth of Virginia Senate Finance Committee*, <http://sfc.virginia.gov/pdf/transportation/2013/HB2313%20Resource%20Materials.pdf>

¹⁹⁶ Canon, Scott, June 1 2014, "Jay Nixon's motives for placing a transportation sales tax on the August ballot remain unclear," *Kansas City Star*, <http://www.kansascity.com/news/government-politics/article447201/Jay-Nixon%E2%80%99s-motives-for-placing-a-transportation-sales-tax-on-the-August-ballot-remain-unclear.html>

projects, sunset provisions, projects that reflect the interests of the constituency, and local control over revenues.^{197,198,199} Voter approval also may restrict the projects considered for funding, as voters tend to prefer high profile capital projects over programs focusing on maintenance and operations.²⁰⁰

Sales tax offers significant potential for increased revenue with a low additional cost (see Exhibit 32). This revenue source is stable in a growing economy; however, tax receipts decrease substantially during recessions. Additionally, the sales tax performs significantly worse than many of the other revenue options with regard to equity and economic efficiency.

The price elasticity of demand for a one percent increase in sales tax is not related to a change in driver behavior. Because general sales tax increases most directly affect the demand for the goods purchased, some states have chosen to apply sales taxes selectively (e.g., vehicle sales taxes and nonfood merchandise). A sales tax increase would not incentivize efficient use of state transportation facilities.

Exhibit 32

North Carolina Sales Tax Rates by Transportation System Performance Objective

	Revenue	Tax Rate	Increase
NC General Sales and Gross Receipts Taxes (2013)²⁰¹	\$5.59 Billion	4.75%	-
LOS C (Maintain Current Conditions) *	2013 revenue + \$1.59 Billion	6.10%	1.35%
LOS A*	2013 revenue + \$3.83 Billion	8.00%	3.25%

*Funding gap amounts are from the *2040 North Carolina Statewide Transportation Plan* and inflation-adjusted to 2013 dollars. This table presents a rough estimate, and does not consider future changes in inflation or discount rate.

¹⁹⁷ Hannay et. al, July 8 2006, "Factors influencing support for local transportation sales tax measures," <http://link.springer.com/article/10.1007%2Fs11116-006-0006-4>

¹⁹⁸ Paget-Seekins, Laurel, March 8 2013, "Competing mobility needs: The users, actors, and discourses in Atlanta, Georgia," *Transport Policy* 27 (2013) 142-149, http://ac.els-cdn.com/S0967070X13000048/1-s2.0-S0967070X13000048-main.pdf?_tid=28fab08-23f6-11e4-85c1-00000aacb361&acdnat=1408050268_b29e7d07b20d034f630d060fd31eeeb

¹⁹⁹ Hepler, Lauren, June 11 2014, "'Abysmal' voter turnout kills 2014 transit tax campaign," Lauren Hepler, *Silicon Valley Business Journal*, <http://www.bizjournals.com/sanjose/news/2014/06/11/abyssmal-voter-turnout-kills-2014-transit-tax.html?page=all>

²⁰⁰ Crabbe et. Al, February 19 2005, "Local Transportation Sales Taxes: California's Experiment in Transportation Finance," <http://www.uctc.net/papers/737.pdf>

²⁰¹ US Census, 2013, "STC003 - State Government Tax Collections: 2013, US Census Bureau, 2013 Annual Survey of State Government Tax Collections," <http://factfinder2.census.gov/>

3.21 Income Tax

Current Use in North Carolina: Currently income tax revenue is not applied to North Carolina DOT projects.

Income Tax Defined. An income tax is a tax levied on the level of income earned by individuals to help fund public investments. While income tax revenue typically contributes to a state's general fund, some states specifically mandate some income tax revenue to transportation needs.

Use in Other States. Currently fifteen states allow local governments to collect income taxes, but four states—Kentucky, Indiana, Oregon, and Virginia—mandate a portion of income tax revenue be dedicated to transportation expenditures. In Indiana, counties have the option of using local income taxes instead of property taxes hikes when faced with a budget shortfall.²⁰² However, revenue potential is marginal and varies by state. Only Maryland, Ohio, and Pennsylvania use local income taxes on a large scale, earning \$3.4 billion, \$3.6 billion, and \$3.1 billion respectively in 2005.²⁰³ Massachusetts recently increased the income tax rate to 6.25% from 5.25% while lowering the state sales tax rate. The change resulted in net revenue for transportation with an additional \$1.1 billion in revenue annually.²⁰⁴

Implementation Considerations. Effective since January 1, 2014, North Carolinians now pay a flat income tax of 5.8%. The Federal Reserve Bank of St. Louis estimates total annual income in North Carolina using data from the first quarter of 2014 to be \$385,752,279,000.²⁰⁵ A one percent increase in income tax in order to dedicate funds to transportation as in Massachusetts would yield an additional \$3,857,522,790 annually.

²⁰²“SSTI Survey of State and Local Transportation Revenue Sources,” 2013, SSTI, http://www.ssti.us/wp/wp-content/uploads/2013/02/SSTI_Revenue-Rpt_FINAL.pdf

²⁰³ “SSTI Survey of State and Local Transportation Revenue Sources,” 2013, SSTI, http://www.ssti.us/wp/wp-content/uploads/2013/02/SSTI_Revenue-Rpt_FINAL.pdf

²⁰⁴ “AASHTO State Funding Proposals,” 2013, AASHTO, http://www.transportation-finance.org/pdf/featured_documents/state%20transportation%20funding%20proposals%202013_09_02.pdf

²⁰⁵ Federal Reserve Bank of St. Louis, “Total Personal Income in North Carolina,” <http://research.stlouisfed.org/fred2/series/NCOTOTL>

3.2m Property Tax

Current Use in North Carolina: State property tax law requires North Carolina counties to determine the value of motor vehicles and prepare tax bills accordingly.²⁰⁶ North Carolina's Tag and Tax Together program allows registration renewals and property taxes to be paid simultaneously.²⁰⁷

Property Tax Defined. A property tax is a fee charged to property owners within North Carolina. Property taxes typically involve land and buildings, but in the case of transportation may involve motor vehicles as well. The value of the tax is related to the fair value of the property being taxed.

Implementation Considerations. Most municipalities in the United States use a portion of property tax revenue for transportation. However, transportation competes with other areas for property tax revenue not generated from motor vehicles.²⁰⁸ In 2013, North Carolina collected \$25 million in revenue from the Tag and Tax Together program, accounting for roughly 0.57 percent of the state's total transportation budget.²⁰⁹ The North Carolina DOT estimated that a 5% increase in local vehicle property taxes implemented in 2016 would yield an additional \$500 million by 2040. The assumed average local tax rate currently is \$0.07/\$100 of assessed value.²¹⁰ According to the NC DOT 2040 Plan, property taxes were given an overall low rating due to a low likelihood of receiving support by elected officials, low revenue predictability, and a lower revenue yield than other alternative policies.

²⁰⁶ NCDOT: Highway Use and Property Taxes, <http://www.ncdot.gov/dmv/vehicle/title/tax/>

²⁰⁷ NCDOT: Tag and Tax Together, <http://www.ncdot.gov/dmv/vehicle/tagtax/>

²⁰⁸ "SSTI Survey of State and Local Transportation Revenue Sources," 2013, SSTI, http://www.ssti.us/wp/wp-content/uploads/2013/02/SSTI_Revenue-Rpt_FINAL.pdf

²⁰⁹ NCDOT, "2013-14 NCDOT Sources and Uses Chart," <http://www.ncdot.gov/download/about/finance/2014BudgetSourcesUses.pdf>

²¹⁰ "NCDOT From Policy to Projects 2040 Plan: Financial Plan and Investment Strategies," 2012, NC Department of Transportation, http://www.ncdot.gov/download/performance/2040_FinanceReport.pdf

3.2n Payroll Tax

Current Use in North Carolina: The state of North Carolina has implemented payroll taxes for causes such as state unemployment insurance and state disability insurance. However, none contribute to the revenue of the Department of Transportation.

Payroll Tax Defined. Also called a withholding tax, a payroll tax is levied on employers as a percentage of the salaries paid to employees. The most common payroll taxes are for state unemployment insurance and state disability insurance.

Use in Other States. In Oregon, firms that operate within either the Tri-County Metropolitan Transportation District or the Lane County Mass Transit District are subject to a transit payroll tax of 0.7237% and 0.7% respectively. The tax is only levied on payroll services within the two districts.²¹¹ New York State charges a metropolitan commuter transportation mobility tax (MCTMT) on businesses that have payrolls exceeding \$312,500 in a given quarter. The MCTMT rate increases at specific payroll expense thresholds: 0.11% between \$312,500 and \$375,000, 0.23% between \$375,000 and \$437,500, and 0.34% for payroll over \$437,500.²¹² Massachusetts has considered implementing a statewide payroll tax to help close the Massachusetts Bay Transportation Authority's annual deficit (between \$140 and \$207 million). A payroll tax of 0.16% was estimated to adequately fulfill the needs.²¹³

Implementation Considerations. The population of Massachusetts in 2013 is estimated to be 6,692,824 while the population for North Carolina is estimated at 9,848,060.²¹⁴ Assuming that average payroll is the same for the two states, if a payroll tax of 0.16% in Massachusetts would generate revenue between \$140 and \$207 million, a similar tax in North Carolina would generate between \$206 and \$305 million in revenue. Though implementing a payroll tax is feasible, because the revenue collection infrastructure is currently in place, there is little connection between a payroll tax and road usage (low economic efficiency).

²¹¹ Oregon Department of Revenue, <http://www.oregon.gov/dor/bus/Pages/transit-excise.aspx>

²¹² The New York State Department of Taxation and Finance, <http://www.tax.ny.gov/bus/mctmt/emp.htm>

²¹³ "The Way Forward: A 21st Century Transportation Plan," 2013, MassDOT, http://www.massdot.state.ma.us/portals/0/docs/infocenter/docs_materials/thewayforward_jan13.pdf

²¹⁴ ⁵ United States Census Bureau, "Annual Population Estimates," <http://www.census.gov/popest/data/state/totals/2013/tables/NST-EST2013-01.xls>

3.2o Advertising Revenue

Current Use in North Carolina: An advertising program began in early September 2014 to sell advertising and naming rights on highway shoulders, rest areas, ferryboats, and DOT websites. A study commissioned by the NCDOT estimated that vehicle-naming rights could be valued between \$800,000 and \$2.2 million per year, while sponsorship of the 511 service could range from \$1 million to \$2 million.²¹⁵

Advertising Revenue Defined. Revenue generated from the NCDOT selling advertising and naming rights to private firms. This can include billboards, signs on freeways, greenways, trails, and department vehicles and websites.

Use in Other States. Currently ten other states sell naming rights for freeway helper vehicles. The Georgia Department of Transportation earns \$1.8 million from State Farm Insurance for advertising rights on vehicles, employee uniforms, and signs in the Atlanta area.²¹⁶

Pinellas County, Florida, recently started an advertising program along Pinellas Trail, a 47-mile greenway. A private company installs new signs to replace old ones while also selling advertising rights to potential sponsors. The county will received 30 percent of profits, estimated at \$46,500 annually.²¹⁷

Implementation Considerations. In the case of Pinellas Trail, public protest occurred over the introduction of new signage and corporate sponsors along the trail. While some of the outcry stemmed from the county choosing a less than satisfactory private firm to partner with, a common complaint was that the signs affected the natural aspects of the trail. Limiting the number of signs on the trail, both with and without advertising, and focusing on trailheads would help alleviate this concern. Additionally, informing the public about the need for additional revenue to meet transportation and trail maintenance costs would help improve public opinion. However, the effort may not be worth the low revenue potential.

Compared to greenway advertising, the vehicle-naming rights and sponsorship of the 511 service in North Carolina generate more revenue with less public concern.

²¹⁵The News and Observer, September 2014, "NCDOT's yellow IMAP trucks to become 'mobile billboards,'" http://www.newsobserver.com/2014/09/05/4123945_ncdots-yellow-imap-trucks-to-become.html?sp=/99/100/&rh=1

²¹⁶Ibid

²¹⁷Tampa Bay Times, July 2014, "County approves advertisements on its Pinellas Trail signs," <http://www.tampabay.com/news/business/firms-can-advertise-on-pinellas-trail-signs/2188142>

3.2p Value Capture (Impact Fees)

Current Use in North Carolina: State law specifically authorizes the use of value capture. Rules affecting each value capture technique in North Carolina vary.²¹⁸

Definition. Transportation infrastructure projects typically increase the value of nearby land and grant additional benefits to firms within distance. Value capture is the use of mechanisms to gain financing for infrastructure projects from companies that stand to benefit from the projects, primarily land developers. For this particular study, value capture applies to the construction of a light rail system in Durham and Orange counties. There are eight common value capture techniques, but four are more prevalent: tax increment financing, special assessments, development impact fees, and joint development.²¹⁹

Use in Other States. Currently 48 states allow for the use of value capture for financing public infrastructure projects. As in North Carolina, policy concerning specific value capture techniques varies in other states. Limitations on how value capture may be used for transportation infrastructure are also present, such as in California, Maryland, and Oregon.²²⁰

Implementation Considerations. Tax increment financing uses taxes levied on the increment in property value within a development to finance development-related costs. While the effectiveness of this tool for transportation projects is debatable, successes in Chicago show that this method can generate revenue. However, this method does bring into question geographic equity concerns such as overlapping districts.²²¹ Special assessments uses geographic proximity and other means to charge property owners that benefit from newly completed infrastructure.²²² North Carolina authorized special assessments levies on “benefited property” from 2008 to 2013.²²³ Development impact fees are one-time charges collected from land developers to help finance new infrastructure.²²⁴ In North Carolina, local governments are unable to collect impact

²¹⁸ “Value Capture: Mechanisms, Practices & Prospects for Stimulating Economic Development and Funding Commuter Rail,” 2011, *Greenleaf Strategies LLC and Parsons Brinckerhoff*, http://redlineregionalrail.org/documents/Research%20Reports%20and%20Memos/RedLine_ValueCapture_FINAL.pdf

²¹⁹ Center for Transportation Studies University of Minnesota, “Value Capture for Transportation Finance: Report to the Minnesota Legislature” June, 2009.

²²⁰ “Value Capture: Mechanisms, Practices & Prospects for Stimulating Economic Development and Funding Commuter Rail,” 2011, *Greenleaf Strategies LLC and Parsons Brinckerhoff*, http://redlineregionalrail.org/documents/Research%20Reports%20and%20Memos/RedLine_ValueCapture_FINAL.pdf

²²¹ Center for Transportation Studies University of Minnesota, “Value Capture for Transportation Finance: Report to the Minnesota Legislature” June, 2009.

²²² ¹ Center for Transportation Studies University of Minnesota, “Value Capture for Transportation Finance: Report to the Minnesota Legislature” June, 2009.

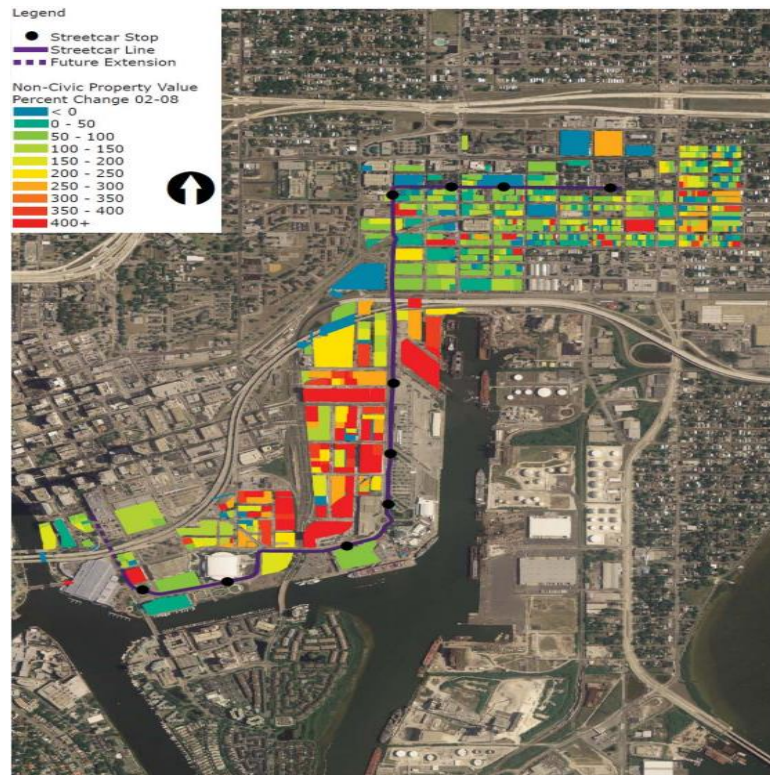
²²³ “Value Capture: Mechanisms, Practices & Prospects for Stimulating Economic Development and Funding Commuter Rail,” 2011, *Greenleaf Strategies LLC and Parsons Brinckerhoff*, http://redlineregionalrail.org/documents/Research%20Reports%20and%20Memos/RedLine_ValueCapture_FINAL.pdf

²²⁴ Center for Transportation Studies University of Minnesota, “Value Capture for Transportation Finance: Report to the Minnesota Legislature” June, 2009.

fees without the approval of the General Assembly, and there is no formal impact fee program in place.²²⁵ Joint development refers to the spatially coincidental development of transportation infrastructure and private real estate development, with the private firm providing either the facility or a financial contribution. Joint development is politically acceptable due to a narrow tax base but requires more administrative oversight.²²⁶ In most cases, multiple value capture techniques are used in conjunction to finance public infrastructure projects. Differing administration and varying revenue by project limits a single value capture technique from financing a project singlehandedly.

Exhibit 33

Property Values Along Tampa Bay's Streetcar Line



Property values along Tampa Bay's streetcar line in Channelside District, increased by over 400 percent from 2002 to 2008.

Source: Brookings Institution, "Value Capture and Tax-Increment Financing Options for Streetcar Construction."

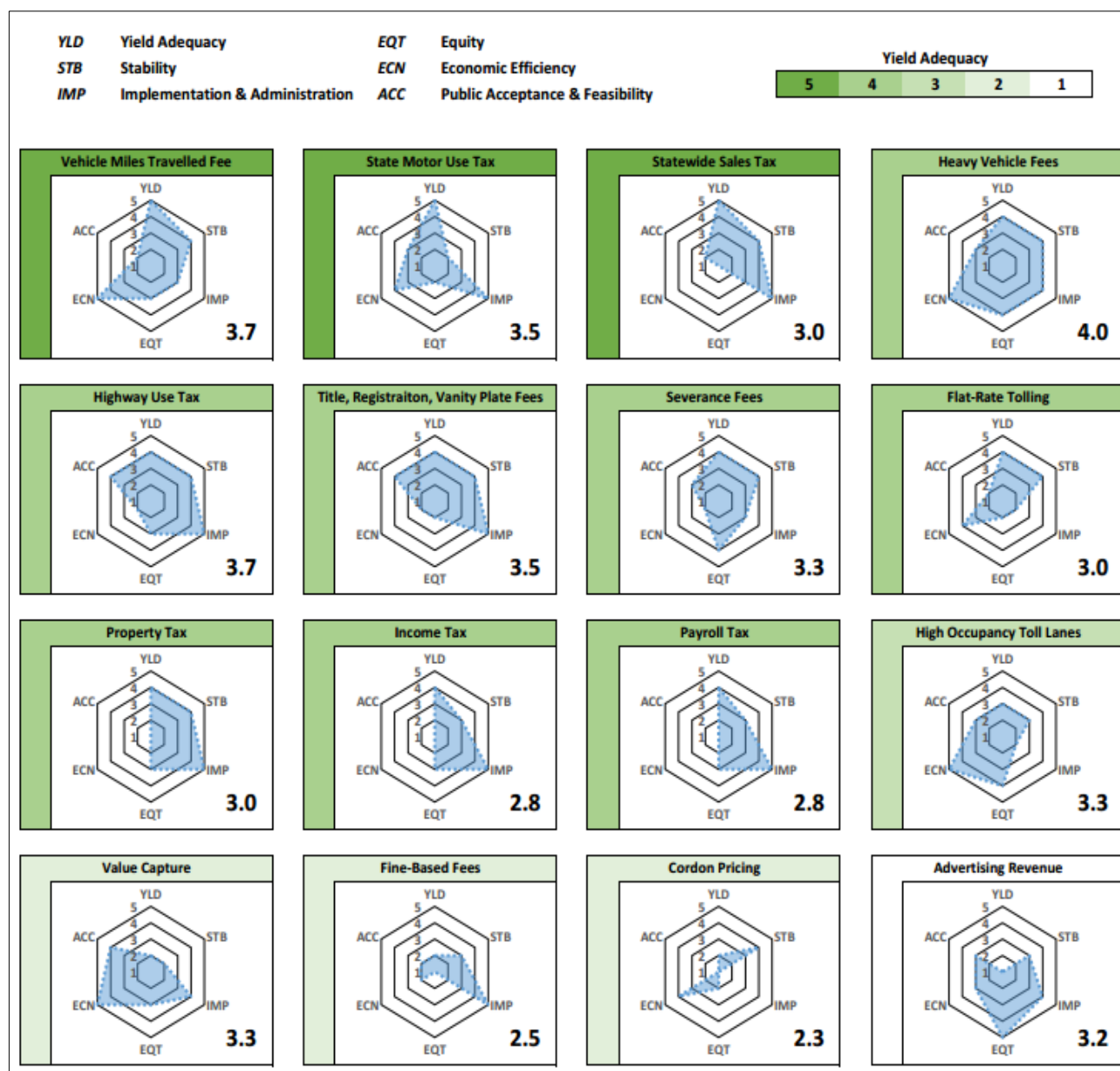
²²⁵ "Value Capture: Mechanisms, Practices & Prospects for Stimulating Economic Development and Funding Commuter Rail," 2011, *Greenleaf Strategies LLC and Parsons Brinckerhoff*, http://redlineregionalrail.org/documents/Research%20Reports%20and%20Memos/RedLine_ValueCapture_FINAL.pdf

²²⁶ Center for Transportation Studies University of Minnesota, "Value Capture for Transportation Finance: Report to the Minnesota Legislature" June, 2009.

3.3 Revenue Options Summary Comparison

The sixteen revenue options discussed in the previous section were ranked and scored based on six criteria (see Exhibit 26). Each revenue option could gain a maximum of five points per criteria. The six criteria scores were then averaged to create Exhibit 34. In Exhibit 34 the highest yielding revenue options are in dark green, and the highest performing options based on the six criteria contain the highest numerical scores.

Exhibit 34
Revenue Options by Yield and Overall Rank



Source: Institute for Transportation Research and Education.

3.4 User Fee and Non-User Fee Discussion about Business Impacts

Determining the most appropriate funding mechanisms to support North Carolina's transportation system requires a keen understanding of how these mechanisms affect businesses. Ideally, these mechanisms would not shift the state's underlying business conditions, such that an unfair advantage may emerge for some firms and an unfair disadvantage for others. For example, large businesses should not stand to gain while small businesses are subject to adverse effects (or vice versa). In addition to a goal of minimizing the potential for competitive disadvantage within an industry, evaluations of revenue should include the considerations of the funding mechanism criteria described previously.

Economists generally prefer user fee systems, because there is a direct relationship between what the user pays and what the user receives. This relationship prevents market distortions, or scenarios where there is an over- or under-consumption of goods. In a system subject to distortion, there is a mismatch between the true value of goods and their market values.

Now that the distinction between user- and non-user fees has been made and market distortions have been discussed, this section will focus on how two types of businesses would likely be affected under hypothetical user fee and non-user fee paradigms. North Carolina's current motor fuels tax paradigm is also evaluated as a means of comparison. Exhibit 35 shows how a freight shipment firm and a banking firm in North Carolina could be affected by a Vehicle Miles Traveled fee user fee paradigm, and by a sales tax system.

Exhibit 35
Business Effects of a VMT or Sales Tax Paradigm

Business Type	Current Scenario (Motor Fuels Tax as Primary Mechanism)	VMT Paradigm (Effect on operating cost)	Sales Tax Paradigm (Sales Tax as Primary Mechanism)	Preferred Paradigm
^A Freight Shipment Firm	<ul style="list-style-type: none"> Fuel costs are firm's main expense Less than half of the firm's operating costs are subject to the NC sales tax 	Total operating costs may potentially increase or stay the same, (depends on VMT rate)	Total operating costs may potentially decrease	Sales Tax
^B Banking Firm	<ul style="list-style-type: none"> Majority of operating costs (excluding personnel) are subject to the NC sales tax 	Total operating costs may potentially decrease	Total operating costs may potentially increase	VMT Paradigm

^A Based on a phone conversation with an executive administrator of a freight shipment firm headquartered in North Carolina, the majority of that firm's 2013 operating costs were from fuel. Of the remaining costs it was estimated that about 70 percent were subject to the state's sales tax.

^B Based the 2013 annual report of a banking firm headquartered in North Carolina's, the majority of that firm's 2013 operating costs (excluding personnel costs) were subject to the state's sales tax. Though no information was provided for regarding the firm's transportation costs, it is estimated that 10 percent of the firm's operating costs (excluding personnel costs) were from transportation (Jean Paul Rodrigue and Theo Nottenboom, "The Geography of Transportation Systems," Transport Costs, 2013).

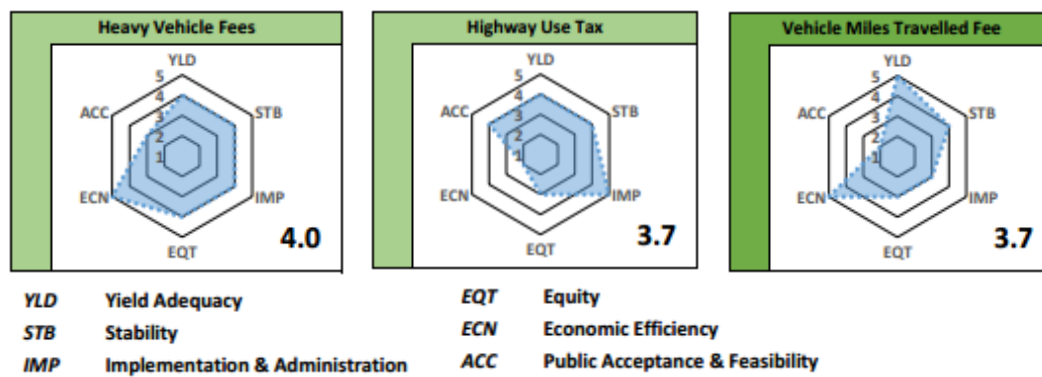
4.0 Recommendations

- 1) **For economic competitiveness in the region and internationally, North Carolina needs access to sufficient transportation systems. Businesses depend on efficient and reliable transportation for many operational functions. As North Carolina faces an unprecedented transportation funding shortfall, implementing strategic revenue enhancement options will require bold decision making and swift action.**
- 2) **Transportation provides benefits to both direct users and the general public, who rely on transported goods and services even though they do not participate directly in the full supply chain. Therefore, a toolbox of funding options that is fiscally wise and balances complementary functions of transportation – reliable and safe travel for individuals and goods and an economic system based on the movement of goods and people which serves the public good – is a preferred option.**
- 3) **Any revenue mechanism (or set of mechanisms) should to the extent possible: 1) generate adequate revenues to sustain the system, 2) provide near- and long-term stability, 3) offer revenue at minimal implementation and administrative costs, 4) equitably distribute benefits and costs to users, 5) relate the use of the system directly with cost of using the system, 6) obtain public acceptability.**

The three highest scoring revenue options based on these criteria are Heavy Vehicle Fees, the Vehicle Miles Traveled Fee, and the Highway Use Tax as shown below. For the complete set of revenue options evaluated by these criteria, that North Carolina could potentially adopt to avert its infrastructure crisis, see Exhibit 34 in the report.

Exhibit 36

Three Highest Ranking Revenue Options



- 4) A vehicle miles traveled fee has the potential to serve as the primary mechanism to fund North Carolina’s transportation system. It offers a high revenue yield and it preserves a user-fee paradigm that prevents market distortion.**

VMT fees of 2.2 cents per mile and 5.2 cents per mile, respectively, establish the investment levels required to sustain today’s current surface transportation system or improve system conditions to Level of Service A (LOS A). However, the implementation of a VMT fee system is likely very time-intensive. It requires substantial outreach to educate North Carolina businesses and residents about its economic benefits. In the meantime, using the North Carolina sales tax seems an appropriate stop-gap measure to support the motor fuels tax. If sales tax revenues (above and beyond those earned at the current rate) were devoted to transportation, rates of 6.1 percent and 8.0 percent, respectively, would suffice to maintain the state’s current transportation system conditions or improve them to LOS A. See section 3.2a “Vehicle Miles Traveled Fee” and section 3.3k “Statewide Sales Tax” for more information about either of these mechanisms.

- 5) Supplement the primary tax with a diverse portfolio of secondary user fees.**

A diverse portfolio of fees can be used to help mitigate the effects of declining motor fuels tax receipts. See Exhibit 36 for the top three performing revenue options by score and Exhibit 34 for sixteen revenue options evaluated by score and organized by yield potential.

- 6) If a sales tax is needed to function as a stop-gap measure to support the state motor fuels tax while a vehicle miles traveled fee gains acceptance, a sales tax increase of up to 1.35 percent (6.1 percent total) is recommended.**

- 7) Conduct further study about how primary and secondary funding mechanisms affect businesses operating costs.**

Understanding and sharing how different revenue mechanisms affect businesses’ bottom lines is crucial for gaining support for investment. Further study that determines specific businesses’ fleet miles, sales tax obligations, operating costs, and how revenue mechanisms specifically affect daily production could provide invaluable insight into which revenue options are the most viable. This study should include a representative sample of multiple types of North Carolina businesses.

8) Request that the federal government consider indexing the federal motor fuels tax to inflation.

Over time, there is a sustained increase in the price of goods and services in the U.S. economy, known as inflation. North Carolina's motor fuels tax (MFT) has been indexed so that it keeps pace with inflation. Only recently, subject to various caps, has North Carolina's MFT been outpaced by inflation. The federal government, however, has not adjusted the rate of its motor fuels tax since 1993. As a result, it dramatically failed to keep pace with inflation. The federal MFT's purchasing power is approximately 40 percent less today, than it was in 1993 (see Exhibit 37).

Exhibit 37

State and Federal Motor Fuels Taxes Relative to Inflation

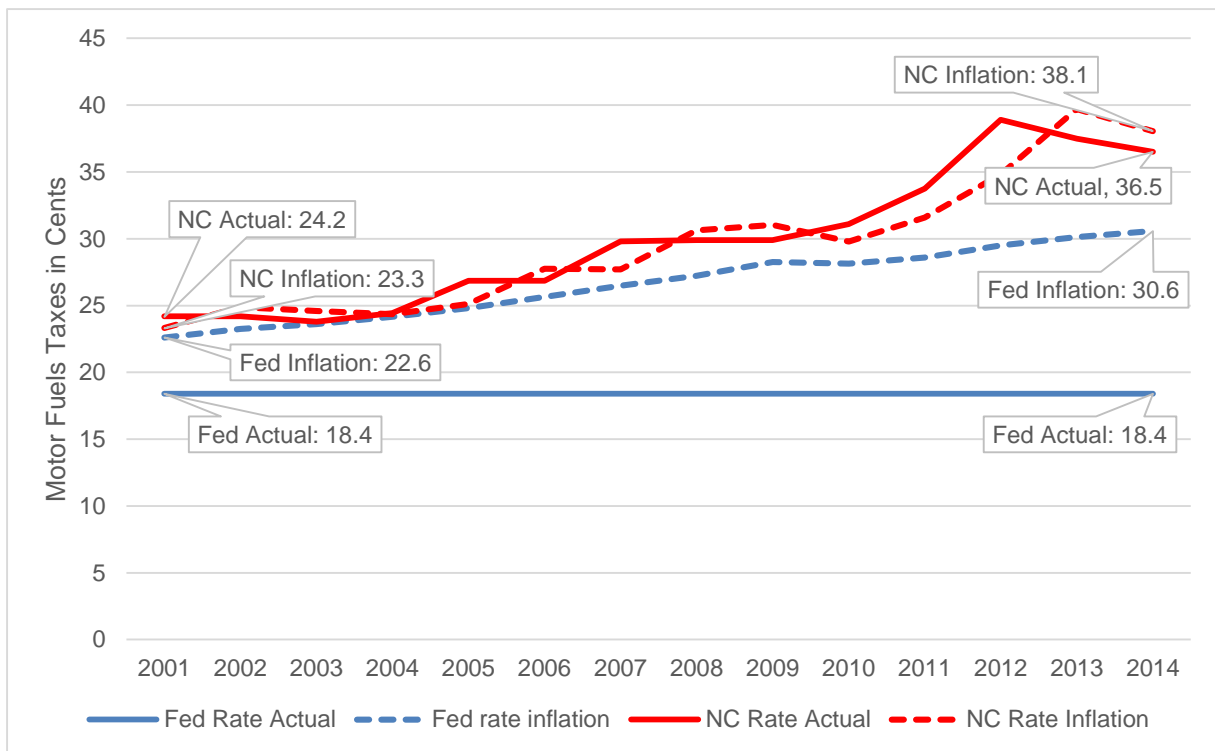


Figure Sources: (1) Coin News Media Group LLC, (2) NCDOR, "Motor Fuels Tax Rates," (3) National Surface Transportation Infrastructure Financing Commission