Chapter 10: Transportation

Introduction

According the EIA, North Carolina's transportation sector consumes nearly 40% of total net energy use – the total of all energy use minus energy lost in the generation of electricity (U.S. EIA, 1998). Furthermore, the transportation sector represents one-third of total energy-related CO_2 emissions in 2000. North Carolina's transportation represents not only the movement of people (personal transportation), but also the movement of goods and services (freight transportation). The policies proposed for the sector rely not just on "top-down" mandates and implementation (i.e., regulation-heavy policies emanating from Raleigh), but also on the willingness of individuals to take advantage of opportunities and incentives that reduce energy consumed by their vehicles. This "carrot vs. stick" approach should discourage less-preferred transportation options and through strong incentives make preferable options appeal to a large number of North Carolinians.

EPA's Air Quality Index

Coal-fired power plants are not the only source of air pollution in North Carolina. In recent years, the transportation sector has overtaken the industrial sector as the most energy intensive. Indeed, according to emissions data published by the EIA, motor gasoline is by far the single largest contributor to air pollutants in the United States. The results of this energy consumption depict a grim reality for North Carolina's citizens and environment:

- North Carolina was ranked 5th nationally in "bad-air" days in 1999.
- According to the American Lung Association, more than 2 million North Carolinians (approximately 25% of the population) live in areas subject to frequent smog alerts.
- In North Carolina in 1998, 240,000 asthma attacks were triggered by ozone, according to a study conducted by ABT Associates.

In response to the ever-increasing levels of air pollution, the EPA has devised the Air Quality Index (available for web access at http://www.epa.gov/airnow/aqibroch/) to help citizens understand how local air quality affects their health. The AQI refers to five major air pollutants--ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide--which are monitored, the highest of which represents the overall AQI for the day. Table 10-1 delineates the respective color code of each of the EPA's six levels of health risk. The color coded AQI is designed to help citizens quickly determine which days they may be at risk of air-related health problems.

According to 2001 EPA data, 21 of 34 counties monitored in North Carolina reported AQI levels as code red. These areas of nonattainment (failure to meet air quality regulations over a three year average) pose significant

Table 10-1:
EPA Air Quality Index

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range	*…air quality conditions are:*	*…as symbolized by this color:*
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

problems for economic growth. In areas of nonattainment, new transportation facilities must be proven to reduce pollution and move toward attainment prior to funding– a very difficult goal. The stringent federal, state and local environmental regulations imposed upon activities in nonattainment areas could severely reduce the capacity of the state to recruit new industry either directly through "new source" restrictions, or by limiting the ability to provide sufficient infrastructure to accommodate new industry. In addition to regulatory restrictions, increased air pollution reduces the attractiveness of "quality of life" amenities that attract businesses to a state or region.

Therefore, it is now becoming more apparent that air quality affects more than North Carolinians' health and environment, but can also represent a major detriment to the economic growth within the state. Transportation policies, therefore, are a double-edged sword: more transportation infrastructure attracts industry, but the use of that infrastructure increases the chances that future enhancements will not be funded. This situation provides a positive opportunity for the State Energy Plan to suggest policies for increased energy efficiency in the transportation sector that do not inhibit prospects for future growth.

The following factors affect energy use in the transportation sector:

- Number of drivers
- Amount of VMT ("Vehicle Miles Traveled" in a personal automobile) per driver
- Vehicular efficiency in miles per gallon (MPG)
- Level of maintenance of the vehicle, which will affect its MPG
- Number of freight transport trips by vehicle, typically tractor-trailer truck
- Average length of freight transport trip

Transportation and Travel in North Carolina

Transportation Fuel Consumption

Between 1960 and 1999, total transportation energy consumption in North Carolina increased an average of 2.88% per year, with motor gasoline, which is the primary transportation fuel, growing 2.69% annually (USEIA 2001). In recent years, from 1995-1999, transportation energy consumption grew 3.42% per year, while overall energy consumption in all sectors increased only 1.9% annually. Thus, growth in energy consumption for the transportation sector has been outpacing overall energy consumption in the state. Clearly, North Carolina must focus on increasing energy efficiency in the transportation sector to have any success in reducing total energy use in the state.

Figure 10-1:
Total Energy Use for Transportation (TBtu/ year)

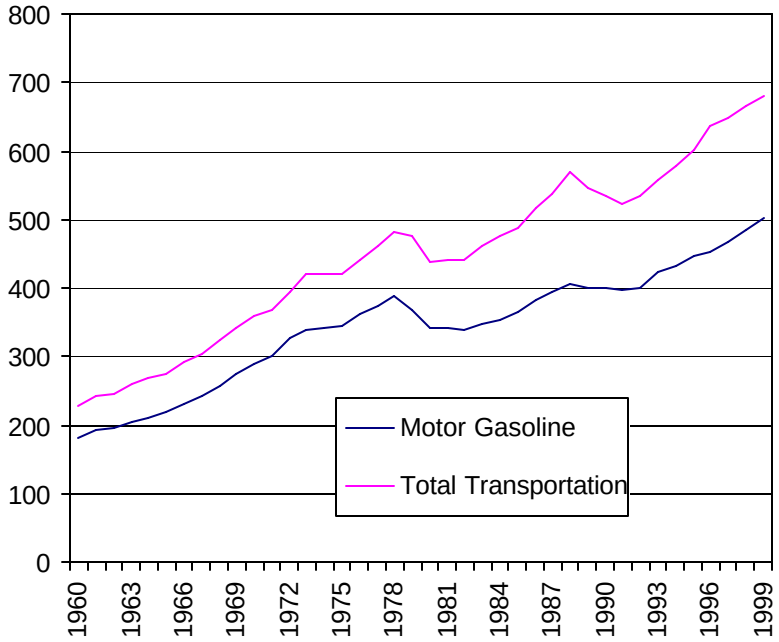


Figure 10-2:
Ethanol Consumption in North Carolina (TBtu)

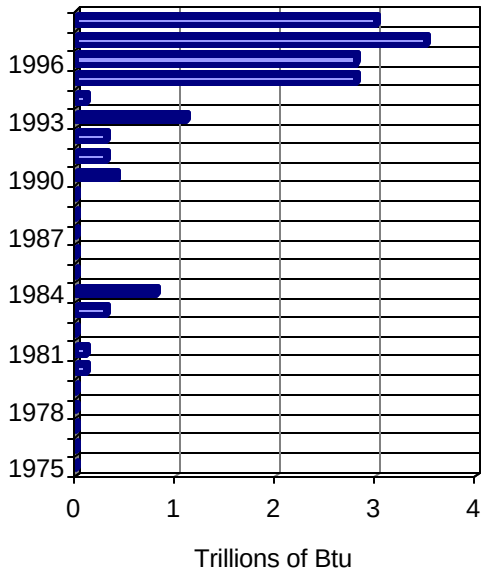
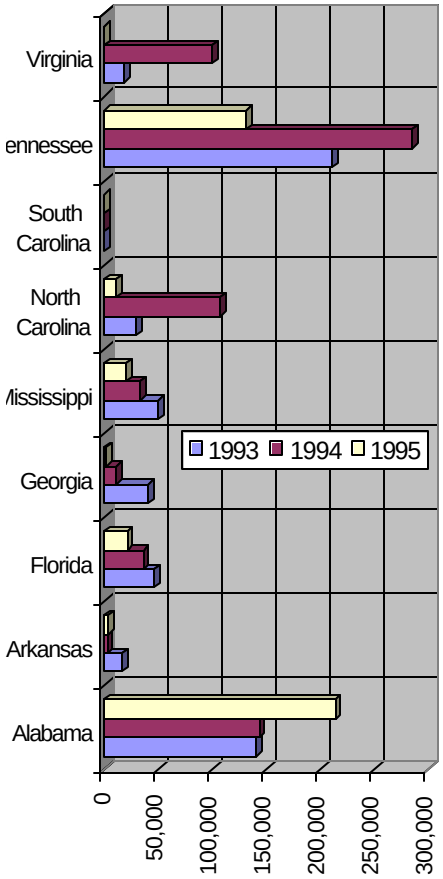


Figure 10-1 shows net energy consumption for transportation in the state between 1960 and 1999. With a couple of exceptions (during the recessions of the early 80s and 90s), total energy consumption has been steadily increasing – a reminder that a price to pay for economic growth is an increase in energy consumption. Motor gasoline provided the bulk of transportation energy, although its percentage of the total has decline recently:

- Motor gasoline provided 78.3% of all transportation energy use in 1960.
- It reached a maximum share of 81.6% in 1976, but dropped to 72.7% of all transportation energy use by 1999.
- Diesel fuel increased its market share from 8% in 1960 to about 20% today.
- Jet fuel has fluctuated somewhat, but generally represents 5% to 7% of total transportation energy use.
- Natural gas reached a maximum market share of 1.6% in 1999, about 11 TBtu.
- As Figure 10-2 shows, ethanol consumption has been growing steadily. In 1999, it provided 3 TBtu, about 0.5% of total sector energy use.

The U.S. Energy Information Agency reports sporadic use of ethanol in North Carolina. As Figure 10-2 reveals, during the 1960-1999 period, there were two "spikes" – in 1985 and 1994, but more recently, ethanol has seen

Figure 10-3:
Ethanol Consumption by Southeastern States (TBtu)

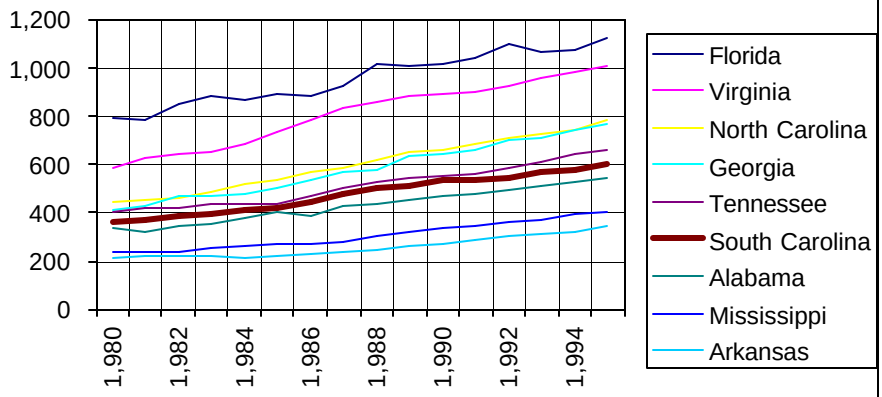


steady growth, peaking at 3.5 TBtu in 1998. North Carolina has never been a leading consumer of ethanol in the southeast (FHWA, 1995). Figure 10-3 shows that Alabama and Tennessee have consistently led the region in ethanol consumption. What is not evident is whether this regional "lag" in ethanol consumption is due to a lack of production capacity, a lack of demand, or both.

Cars and Drivers

North Carolina has consistently ranked second over the past 50 years in number of drivers in the Southeast. Figure 10-4 shows that during the time period 1980-1995, North Carolina ranked third in the region in VMT per mile of public road, behind Florida and Virginia. The figure shows that roadways have been getting consistently more use. VMT per miles of roadway grew 3.8% per year, second only to Georgia's 4.2% annual increase. As of 1995, North Carolina had 3,517,585 registered automobiles, ranked fourth in the southeast, behind Florida, Virginia and Georgia.

Figure 10-4:
Roadway Availability (VMT per mile of roadway)



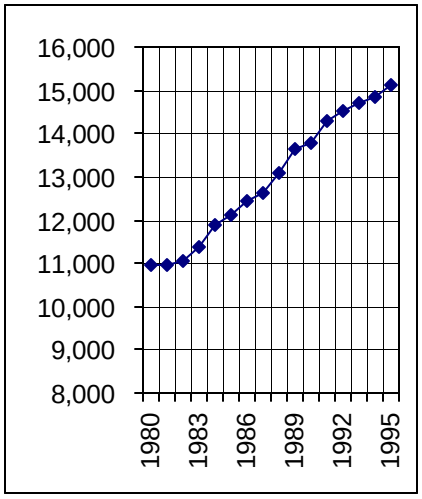
Vehicle Miles Traveled

Vehicle miles traveled (VMT) is a measure of the amount of personal (non-commercial) travel. Between the years 1980-1995, North Carolina consistently ranked fourth behind Florida, Georgia and Virginia in total VMT on urban roadways. With regard to rural VMT, North Carolina has dominated the region, and by current estimates is ranked first. In the period between 1980 and 1995, North Carolina's urban VMT has risen by over 123 percent, ranked second behind Georgia with an increase of over 162 percent. North Carolina's rural VMT rose 56 percent between 1980 and 1995, ranked fourth behind Mississippi (77.3 percent), Alabama (65.5 percent) and Arkansas (63.7 percent). In looking at the urban / rural split, all southeastern states saw more growth in urban VMT relative to rural VMT. However if we look at 1995 levels of VMT, Florida, Georgia, North Carolina, Tennessee and Virginia had higher relative shares of urban VMT,

indicating more transportation activity occurring in urban areas as opposed to rural areas.

Figure 10-5 plots VMT per driver in North Carolina over the past 15 years. Annual per driver mileage has risen 38% -- an annual rate of increase of 2.2%. Obviously, even if transportation efficiency improves, the substantial increase in VMT per driver will continue to increase energy consumption in the transportation sector.

Figure 10-5:
Vehicle Miles Traveled per Driver – North Carolina



VMT Reduction Strategies

The simplest way to reduce transportation energy use would to provide more viable options for people other than a single-occupant vehicle. If North Carolinians would ride the bus to work, walk to lunch or eat lunch at their place of employment, shop at stores near their home or business, or otherwise strive to reduce the amount of time spent in their automobiles, transportation energy use would drop precipitously. Other benefits to the state and its citizens would include fewer vehicular accidents, less traffic with which to struggle, fewer delays for road maintenance due to reduced driving loads, more productive time while commuting, less time spent at service stations purchasing fuel, more exercise, and so on. Many other countries follow this more transportation-efficient lifestyle and maintain very high standards of living. However, our country and state have not. There are many reasons for this disparity, but two are most evident: many urban areas in other countries developed the template for their core infrastructure prior to the widespread use of the automobile, and many countries operate under a political culture that does not chafe under strong centralized policies and tax structures.

North Carolinians often use their vehicles for vacation travel, especially with increased concern about airline safety. Our state does not have an alternative transportation network of train and bus transport like the northeastern states.

The North Carolina Department of Transportation is planning an expanded intercity passenger rail network in the state. The effort is now in the planning stage for a high speed Raleigh-to-Charlotte line.

Telecommuting

There has been considerable interest in telecommuting as an energy-saving option. Telecommuting involves employers allowing their staff to work at home certain days of the week, or by establishing telecommuting centers akin to satellite offices closer to suburban residences of workers. By avoiding or reducing the daily commute, travelers would save on transportation energy use. Table 10-2 is a list of advantages and disadvantages of a formal telecommuting program for state employees compiled by the North Carolina State Auditor.

Table 10-2:

Advantages and Disadvantages Telecommuting

	ADVANTAGES	DISADVANTAGES
EMPLOYER	Reduced physical plant costs (office space, parking, furniture, etc.)	Less direct supervision/control over employee; requires task management
	Rent/Construction cost avoidance	Coordination of work among employees more difficult
	Possible lower employee turnover rates	Some initial computer costs for system implementation
	Possible increased employee productivity	Monthly system charges for communication requirements
	Accommodation of disabled or chronically ill employees	Possible reimbursement to employee for use of space in home
	Selling point for new employees	Less immediate access to employee
EMPLOYEE	Commuting vehicle savings; time savings; lowered auto insurance premiums	Planned work time interrupted by family or other distractions; stress
	Reduces peril of commuting accident	Lack of interaction with other staff members (reduces learning from their experiences)
	Reduces personal costs (clothing, food, travel)	Possible lowered morale from isolationism
	Possible improved employee morale from greater control over work	Requires self-motivation and self-discipline
	Flexibility to perform other tasks/ appointments during day	Possible "workaholism"
	Employee able to set schedule to work when most productive	May lack area in home to dedicate as "work space"

Source: Compiled from literature

Impact on energy consumption for state employees

There are over 30 North Carolina counties that currently have non-attainment status with the EPA, the majority of which are in larger metropolitan areas. Furthermore, these metro areas tend to have the most congestion and would benefit most from the emissions reductions of a telecommuting program. Using a sample of state employees, the State Auditor calculated the average round-trip commute at 56.5 miles with emissions of 1.05 pound of pollutants per mile driven. According to the Bureau of Labor Statistics, government employees in North Carolina total about 640,000. Assuming participation of 5%, nearly two million pounds of emissions would be eliminated daily. The majority of these reductions would occur in high-traffic metro areas where mitigation is most crucial.

Impact on energy consumption for North Carolina as a whole

Some considerations in fairly evaluating the practice strictly in terms of energy savings include:

- Jobs that are not conducive to telecommuting.
- Total number of commute hours saved.
- In-house energy use.
- Office or facility utility rate change due to load and occupancy changes.
- Perceptions of worker productivity and efficiency.

As the following analysis shows, even with an optimistic set of assumptions, telecommuting would have virtually no impact on statewide transportation energy use:

- 5% of employees in the state able to work at home are located an average of 28 miles from work (Telecommuting report)
- Each telecommuter works at home 60 days per year.
- 40% of telecommuters normally set their heating and cooling system back during the day, so they would have to operate the system.
- 60% of telecommuters are able to keep the lighting in their office off during the days they work at home.
- Energy savings and increases per telecommuting employee would be as follows:
  - Gasoline savings 20.1 million Btu
  - Lighting energy savings 0.10 million Btu
  - Home heating increase 1.1 million Btu
  - Home cooling increase 0.5 million Btu
  - Net savings per telecommuter 18.7 million Btu
- If 125,000 workers become telecommuters, following the above assumptions, the total statewide energy savings would be about 0.71 TBtu – less than 1% of motor gasoline use in the state in 1999.

Mass Transit Use

Most North Carolinians have the option to use some form of mass transit to meet at least a portion of their daily transportation needs. The state has several passenger rail lines for intercity travel and bus lines for either intercity or intracity travel. According to North Carolina's long-range transit plan, Transit 2001, the state's local transit system carried almost 40 million riders traveling over 438 million miles with over 1,900 buses and vans. Intercity bus systems (Greyhound and Trailways in North Carolina) operated 9.3 million bus-miles, transporting almost 300,000 passengers in North Carolina for fiscal year 1994-95 (Transit 2001).

Transit in North Carolina is divided among rural and urban transit providers. This difference is not only place-specific but also goal-specific. Urban transit systems have a primary goal of providing mass transit, in particular, for commuting to and from work. Rural transit providers have an expanded mission that includes social services. As such, the rural operators rely on smaller vehicles with flexible routes and hours whereas their urban counterparts rely primarily on fixed schedules and fixed routes.

While mass transit has been successful in the state, most citizens continue to rely on their private vehicles for their daily commutes, errands, and other transportation needs. Considering that 2000 total urban VMT in North Carolina climbed to almost 95 billion miles, the 2.2 billion passenger-miles served by transit provided only 4% of total miles traveled by North Carolinians.

Non-Motorized Modes of Travel

Data for non-motorized modes of travel are difficult to obtain. This fact indicates the lack of attention paid to these modes of transportation, and perhaps indicates a largely ignored policy area despite large scale research efforts such as the National Bicycle and Walking Study (1992).

Smart Growth and Energy Efficient Community Design

The design of most of North Carolina's towns and cities fail to encourage transportation efficiency via shorter shopping trips, increased pedestrianism, and augmented mass transit use. This is due in large part to the trend in urbanization after World War II that favored the consumption of land for residential uses on the periphery of urban areas. This type of suburban development lent itself to reliance on the automobile because transit, walking and biking was an inefficient transportation option. In fact, more and more suburban shopping and office park areas do not have sidewalks, nor have they efficiently incorporated transportation planning in their design other than parking lots. Instead, North Carolinians drive several miles to centralized shopping centers or work with expansive parking areas.

"Smart Growth" is a trend in planning that attempts to merge commitments to economic development while at the same time preserving and enhancing other quality of life measures. In North Carolina, Smart Growth NC, a state commission appointed to address Smart Growth issues, stated principles that include regional solutions to transportation problems, increasing local flexibility to address growth issues, and making efficient use of public resources (Smart Growth NC 2001)

Smart Growth via land use measures reduces VMT in a number of ways:

- An increase in density brings (by definition) origins and destinations closer together, thus potentially reducing the amount of travel.
- Increasing the "mix" of uses in more dense areas which makes locations much more accessible and less reliant on automobile travel.
- Adoption of public policies that include transportation and travel planning as an integral part of land use planning.
- Traditional Neighborhood Development (TND) attempts to reverse decades of development policies attributed to "suburban sprawl." That is, wide residential streets, the emphasis on the automobile, cul-de-sacs, and large-scale segregation of otherwise compatible land uses, such as residential, retail, and office-institutional, that are kept apart because of outdated zoning regulations. Creating a neighborhood or community around mobility and accessibility is sound urban planning in both an economic and environmental sense.
- Transit-Oriented Development (TOD) focuses development on transit nodes, or those areas where the routes of a single or multiple modes of transportation meet. The development surrounding these routes is more diversified than typical developments, encouraging residential and economic activity to occur within a small spatial extent. While TOD's

may be thought of as largely self-sufficient, they are also an opportunity to attract park-and-ride facilities to encourage multimodal trips as well as attract the economic activity potential of these "non-local" travelers. TOD's can be encouraged as "infill" development, or development in an already urbanized area, or they may be incorporated into new suburban development. The expansion of the Charlotte mass transit system has embraced Transit-Oriented Development.

- FNMA, known familiarly as Fannie Mae, is a large national lending institution that now offers a Location Efficient Mortgage, which is the first home ownership initiative that seeks to link housing with efficient public transportation. It effectively recognizes the savings and benefits that result from proper land use and planning. As an example, if a household is located closer to the urban core, more money can logically be spent on housing. Location Efficient Mortgages recognize this in calculating the ability of a household to shoulder the long-term burden of a mortgage, thus providing a greater incentive for households to locate in areas that provide greater transportation options.

Whether a locality embraces TND or TOD as a development paradigm, or merely makes sure they are aware of the transportation impacts of individual developments within their jurisdiction, the potential that proper land use planning principles have to positively affect transportation outcomes is significant and should be promoted and supported by NCDOT and the State Energy Office.

State Policies for VMT Reduction

Following is a brief listing of what other states are doing to reduce VMT and why these particular programs have been successful. As one of the primary goals of the Energy Policy Working Group is to establish a leadership position with energy policy, it would be wise for policymakers to draw from other successful programs and create a specific set of incentives and programs for North Carolina. While many of these plans are at a stage where program evaluation would yield little information, it is still useful to observe those policies that have garnered enough political support to be implemented.

Hawaii has put particular emphasis on improving the bicycle transportation system. The bicycle racks recently added to city buses in Honolulu are frequently used, indicating that the combination of individual mobility and mass transit can be effective. Hawaii has also used land planning specifically designed to reduce congestion and the need for transportation. This mixed-use development planning, in which residential and commercial land use is allowed in the same neighborhood, can reduce the need for commuting between residential and commercial districts.

Iowa has implemented programs through Iowa DOT to improve transportation efficiency. These programs include the intermodal transportation loan program and several efficiency demonstration programs. Iowa DOT has also established the Iowa Clean Air Attainment Program (ICAAP). This program provides $4.7 million in funding each year to city, county and state governments for projects that create traffic flow

Figure 10-6:
Vehicle Miles Traveled per Gallon – North Carolina

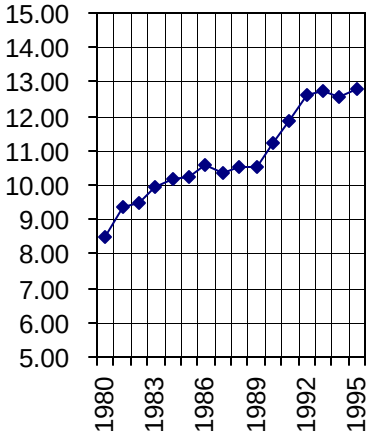


Figure 10-7a:
Economics of Vehicle Improving from 25 MPG to 40 MPG*

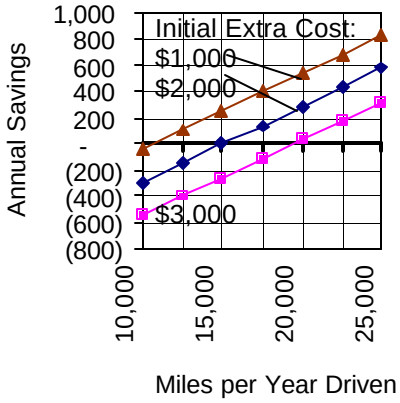
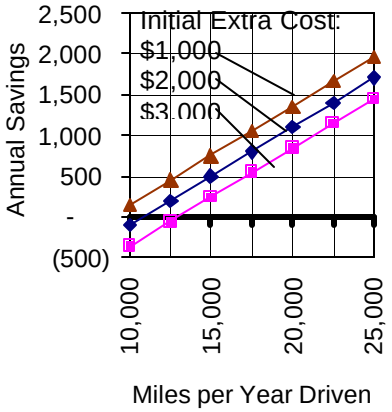


Figure 10-7b:
Economics of Vehicle Improving from 12 MPG to 18 MPG*



* assumes fuel cost of $1.45 per gallon and vehicle loan for 5 years at 10% interest

improvements, reduce vehicle miles traveled, eliminate single-occupant vehicles and develop other transportation improvements.

Tennessee has continued to assess and apply alternative work schedules, teleconferencing and other work methods that save travel times, reduce travel costs and increase productivity. The state of Tennessee has also taken cost-effective steps to expand state vanpool and carpool programs, including procuring additional vans and federal financial support. Additionally, a new pre-tax flexible benefit program has been instituted for state employees who use public transit or vanpools in their commute to work. These measures are supported by the numerous Clean Air Partnerships the state has formed in major metropolitan areas to offer more transportation choices, enhanced mobility and improved air quality.

Vehicle and System Efficiency

Vehicle Efficiency

Although North Carolinians are driving more miles each year, they are fortunately doing so with increased efficiency (if not through driving habits, then certainly by using more energy-efficient vehicles). Figure 10-6 shows that overall vehicular efficiency – calculated by dividing the total VMT by the total number of gallons of transportation fuel used in North Carolina – has improved 52% since 1980 – about a 2.8% improvement each year.

The future bodes well for continued improvements in vehicle efficiency. Perhaps the most practical vehicle efficiency option is the hybrid automobile, which combines an electric engine with a small gasoline-powered engine. The electric engine receives most of its recharging needs from regenerative braking.

In addition to hybrid vehicles, a 2001 report by the American Council for an Energy Efficient Economy concludes that an advanced package of technologies can increase fuel efficiency of conventional, non-hybrid gasoline vehicles to 41mpg -- a 70% improvement -- including all light vehicle classes (DeCicco, An, and Ross, 2001.) Hybrid vehicles will most likely not make a major market penetration for the next decade due to low demand and therefore a low incentive to produce these vehicles for a currently unprofitable market. Therefore, replacing conventional vehicles with more efficient, similar options will serve as the best strategy for the near and mid-term.

Figure 7-10a and 7-10b show that efficiency improvements in vehicles can yield substantial economic returns. The figures compare the extra costs and energy savings from investing in more efficient vehicles. For example, Figure 7-10a shows that paying $2,000 more for a vehicle that gets 40 miles per gallon instead of 25 miles per gallon will provide an annual gasoline savings of about $275 if driven an average of 20,000 miles per year. Figure 7-10b illustrates that those purchasing larger vehicles, such as trucks or sports utility vehicles can save even more. By upgrading from a vehicle getting only 12 miles per gallon up to one that gets 18 miles per gallon, the owner can save $1,200 per year assuming an added investment of $2,000

and 20,000 miles driven per year. While on its face it would seem that greater savings would accrue at the top end of fuel efficiency, research shows that greater efficiency gains come from targeting heavier consumers of gasoline. It would be wise for the State Energy Office to work with automobile dealers throughout the state to promote awareness of mileage savings and vehicle efficiency improvements to consumers.

System Efficiency

Transportation system efficiency attempts to create a freer flowing network, which in turn reduces gasoline consumption and emissions. Steady flows of traffic are not accelerating or decelerating, and thus remain at their most energy efficient. Efficiency can be thought of from two perspectives: managing the demand for travel and managing the supply of transportation infrastructure**.**

Traffic Signal Synchronization- Improving the responsiveness of traffic signals in urban areas is another simple yet effective way of improving system efficiency by increasing flow and reducing acceleration and deceleration. The technology required, which involves placing sensors in the roadway itself that communicate with traffic signals is simple, relatively inexpensive and increasingly prevalent in rural as well as urban areas.

Telecommunication / Transportation Connectivity-Transportation agencies in areas such as Montgomery County, Maryland; Washington D.C. and San Diego, California are incorporating telecommunications into the services they provide. Such service can be provided over cable television stations, available over the internet or through a dial-up service. Real-time traffic conditions can be broadcast over the internet or television, allowing those who access that information to alter their travel plans to avoid congestion. This information can be in the form of pole-mounted cameras or dynamic maps displayed on a web page.

Once a traveler is on the road, telecommunications can still play a role. Infrastructure such as Variable Message Signs warn highway travelers about road conditions and delays ahead of them, and if possible, allow a traveler to alter their travel en route. For those who have the means and desire, vehicle location and mapping systems allow for real time mapping and location of that vehicle and existing traffic conditions.

Regardless of the integration of telecommunications and transportation, investment is required on the part of the state to create the telecommunications infrastructure necessary to implement these policies.

Incident Response-One way to decrease bottlenecks and congestion on highways is to ensure there is a response team to either divert traffic or clear off the remnants of spills or accidents in a timely manner. By doing so, this simple measure can ensure to the best extent possible that vehicle flow is maintained.

Sample State Policies for Vehicle and System Efficiency

Many state energy plans address vehicle and transportation system efficiency. It would be wise to consider what has been deemed as politically feasible. Again, many of these programs and policies are too young for proper program evaluation to consider their cost-effectiveness.

California's Energy Commission (CEC) and Transportation Energy Technologies Advancement Program (TETAP) provides grants in the form of co-financing for near term (3-5 years) research and demonstration of transportation technologies that will reduce that state's dependence on petroleum-based fuels.

Connecticut has created specific mileage legislation requiring cars and light trucks purchased for state fleets (exempting police cars). The legislation requires vehicles to average 35 mpg in highway driving as of October 1, 2001 and increases to 50 mpg as of January 1, 2003.

Iowa has placed particular emphasis on Traffic light synchronization: In 1992, Iowa law (Senate File 419) began requiring all cities with more than three traffic lights to establish a traffic light synchronization program in accordance with Iowa Department of Transportation.

Alternative Fueled Vehicles

Alternative Fueled Vehicles, known as AFVs, use fuels such as CNG, propane, electricity or ethanol. Alternative fuels derived from agricultural biomass sources are the most commonly used fuels today. Because the fuel sources come from the domestic agriculture industry, they have advantages in terms of national security, and national and state economies.

Alternative Fuels most commonly used in transportation include:

- Biodiesel – contains no petroleum, and is produced from domestic sources such as vegetable oil and recycled (non-petroleum) greases. It may be used in a 20% blend with petroleum diesel (B20) in unmodified engines, and can be used unblended in appropriately modified engines;
- Liquefied Petroleum Gas (LPG) – composed of 95% propane and 5% butane;
- Natural Gas – produced in liquid and compressed form, this fuel generates lower CO and VOC (volatile organic compound) emissions;
- Ethanol – grain alcohol made from corn, sugarcane, and biomass. Ethanol can be blended in a 10% mixture (E10) or even higher mixtures such as 85% and 90% (E85 and E90, respectively) in appropriately modified engines.

Major issues with use of alternative fuels include:

- Extra cost of fuel compared to benefits
- Concerns about air emissions at fuel production plants

- Concerns about air emissions from vehicles burning alternative fuels
- Fueling infrastructure

The chapter on Fossil Fuels deals in detail with the production and use of alternative fuels. This chapter focuses more on use of the fuel specifically in vehicles. The previous chapter examined some of the impacts of increasing use of ethanol fuels derived from biomass to 10% of transportation energy use. It would require approximately 1-million acres of corn production, or similar acreage of other agricultural products.

The easiest way to integrate ethanol into the state's transportation system is by requiring or providing incentives for the use of a mixture of fuels, typically 10% ethanol and 90% gasoline – known as gasohol. Throughout the country, states are developing a variety of programs and policies to encourage the use of alternative fuels.

State Policies on Alternative Fuels

As the Energy Policy Working Group moves to create a state energy plan, examining what pertinent programs have worked in neighboring states will provide policymakers with the necessary information to best develop incentives and programs for North Carolina. Following is a listing of what other states are doing regarding alternative fuels developments and policymaking:

Arkansas has implemented an Advanced Biofuels Tax Credit for industries which provides a 30% credit for the cost of buildings, equipment and intellectual property necessary to produce advanced biofuels, such as ethanol, methanol and other biomass-derived fuels. Arkansas also has established the Emerging Manufacturing Facilities Credit: The Arkansas Emerging Technology Development Act of 1999 established a state income tax credit of 50% of the amount to purchase or construct a facility that designs, develops or produces photovoltaics (solar cells), electric vehicle components, fuel cells, microturbines, Stirling engines, or devices that are reliant on nanotechnology. Additionally, the state offers an Alternative Fueled Vehicle Conversion Rebate Program: This program, administered by the Arkansas Department of Economic Development, provides a 50% rebate for the cost of conversion of a vehicle to alternative fuels.

California has created programs through the California Energy Commission and Transportation Energy Technologies Advancement Program which provide grants in the form of co-financing for near-term (3-5 years) research and demonstration of transportation technologies that will reduce the state's dependence on petroleum-based fuels. In an effort to get more electric vehicles (EVs) on the road, the CEC has approved an incentive program with four automakers. The Energy Commission's Vehicle Infrastructure Assistance Program will allocate $100,000 each to automakers currently marketing electric vehicles. The state has also created EV buy-down incentives, administered through the California Energy Commission, which offer $5,000 rebates for the purchase of new, zero-emission, light-duty vehicles.

Connecticut provides an AFV and associated equipment tax exemption which includes new motor vehicles exclusively powered by alternative fuels as well as the storage, use or consumption of such a vehicle. Alternate fuel vehicle conversion equipment is included as well. State legislation also provides an AFV charging station credit This law allows a credit toward the corporate income tax in the amount of 50% of the cost of: 1) cost of construction of filling stations or improvements to existing stations which allow that station to provide CNG, LNG, or LPG (propane); 2) equipment used to convert vehicles to run exclusively on one of these fuels or electricity, or on one of these fuels and some other fuel; and 3) equipment used in a CNG, LNG, or LPG filling station, or an electric recharging station, for vehicles powered by a clean alternative fuel. Additionally, Connecticut offers a corporate business tax credit in the amount of 10% of the incremental cost of an AFV.

Hawaii has encouraged early deployment of electric vehicles in Honolulu. The city is becoming the first "electric vehicle-ready" city in the United States, as Hawaiian Electric Company installs a network of up to 20 electric Rapid-Charger stations where electric vehicles can be recharged in less than nine minutes. This will be an important element of infrastructure to support deployment of electric vehicles. The state has also promoted incentives for ownership of Alternative Fueled Vehicles (AFVs): Hawaii offers incentives to own and operate AFVs: the state fuel tax on propane is 11¢ per gallon (compared to 16¢ per gallon for diesel); electric vehicles (identified by special license plates) may park free at parking meters and use HOV lanes at any time. Additionally, the cost of equipment to dispense "clean fuel" is tax deductible. An alcohol fuels tax exemption is also provided which exempts from the state excise tax on retail sales all revenue from the sale of alcohol fuels used in final consumption.

Iowa has mandated a Government vehicle fuel standard: Since January 1993, Iowa's local, county and state governments have been required by law to use ethanol-blended fuel in all applicable vehicles. Iowa also provides an Ethanol Based Fuels Exemption: This sales tax exemption allows those who blend conventional motor fuel with alcohol to produce ethanol to file for a refund for the "difference between [sales] taxes paid on the motor fuel purchased to produce ethanol blended gasoline and the tax due on the ethanol blended gasoline." In effect, ethanol-blended gasoline is taxed at 19 cents per gallon while non-ethanol blended gasoline is taxed at 20 cents per gallon.

New York has instituted a a two-phase plan which will double the number of existing CNG fueling stations in the State. Phase I calls for 30 low-volume FuelMaker CNG sites at DOT facilities across the State. These sites are open to State vehicles only, and are capable of producing up to 100 gallons of CNG per day. Additionally, the Clean Fueled Bus Program makes funding available annually to cover the incremental cost of procuring alternative-fuel transit buses and infrastructure.

Policy Recommendations from Transportation Study Groups

Several statewide policy-oriented study groups have written documents with recommendations regarding the future of transportation in North Carolina. The documents come from North Carolina's Statewide Transportation Plan, Transit 2001, The Long Range Plan for Bicycling and Walking, and North Carolina's Clean Air Bill.

2000 Statewide Multimodal Transportation Plan

The North Carolina Statewide Multi-modal plan is a developing document slated for completion by fall of 2002. This update of the 1995 plan is an evolving document benefiting from the input of a variety of stakeholders such as Metropolitan Planning Organizations (MPOs), NCDOT staff and the general public. There are six goals in North Carolina's Statewide Transportation Plan that are consistent with energy policy. These policies as stated are described below:

- Provide the infrastructure necessary to optimize mobility and reliability in the transportation of passengers and freight.
  - Integrating transportation systems enhances the ability of service providers to provide a truly multimodal network. Increasing mobility and reliability in an integrated multimodal network encourages individuals to undertake modes of transportation other than a single occupant vehicle.
  - Providing the right infrastructure reduces travel times as well as congestion and bottlenecks. Reducing travel times reduces the amount of time people spend on the transportation system. In addition, reducing congestion and bottlenecks enhances the flow of traffic, capitalizing on the most energy efficient parts of a vehicle's cycle.
- Provide a variety of transportation options for personal travel and goods movement.
  - In order to integrate a transportation system, there must be many facets and travel choices available. North Carolina's statewide plan wishes to incorporate not only different modes of transportation such as auto, bus and rail, but also ensure that these options are available within regions, between cities and available for extra-local travel.
- Encourage the development of growth management mechanisms intended to coordinate infrastructure investment with development.
  - One goal of growth management is to ensure that the ability of local governments to provide services efficiently is not compromised. Focusing development closer to the core of a city or region is more efficient than allowing development on the periphery. With respect to transportation and energy efficiency, focused development allows areas to easily provide transit services and alternatives to travel other than a private automobile.
- Increase the efficiency of the overall transportation system by facilitating the interconnection of transportation modes.

  - The state of North Carolina wishes to encourage "nodes" of infrastructure or development wherein transfers between modes of transportation are not only possible, but also easy.

- Maximize compatibility of the transportation system with environmental considerations, as well as with the historic and cultural resources of the state.
  - The state identifies a need to "develop and implement strategies to reduce transportation-related energy consumption."
- Provide increased responsibility and continuing cooperation, coordination, and participation with NCDOT's customers: the public, stakeholders, private sector, and local, regional, state and federal governments.

Transit 2001

Transit 2001 is a long-range transit plan drafted in 1997 by the Transit 2001 Commission for then-Governor Jim Hunt. Similar to the Statewide Multimodal Transportation Plan being developed by NCDOT, Transit 2001 is a product of extensive input from stakeholders and a steering committee. Its primary goal is to enhance the transit infrastructure of the state to include intercity and intracity bus transit, as well as an intercity rail service connecting the urban centers of North Carolina. The goals of the plan are as follows:

- Ensure greater choices and more travel options tailored to the varying needs of residents, visitors, businesses and industry;
- Increase choices in residential arrangements that minimize the burden of travel and allow safe and convenient use of a variety of travel options;
- Deploy new systems, services and technologies to ease the travel burden and to extend and increase the efficiency of the current highway system;
- Take a leadership role in development of a truly seamless multimodal transportation network which links
  - access to services and facilities for those with limited transportation options in rural areas
  - a fully functional network of convenient shared-ride transit services in metropolitan regions
  - Conventional and high-speed rail passenger service in heavily traveled corridors.

Long Range Transportation Plan for Bicycling and Walking

The Long Range Transportation Plan for Bicycling and Walking was drafted in 1996 by the NCDOT Division of Bicycle and Pedestrian Transportation. This plan, prepared in collaboration with UNC-CH Highway Safety Research Center, is meant to encourage non-motorized modes of transportation and to help guide the development of local transportation plans that include non-motorized elements such as greenways, bikeways and bike lanes and land use practices that enhance biking and walking. While

this plan was adopted by NCDOT, it is really left up to counties, cities and towns to adopt local transportation plans that can be included in NCDOT Transportation Improvement Programs. The long-range plan includes the following goals:

- Provide the bicycle and pedestrian facilities necessary to support the mobility needs and economic vitality of communities throughout North Carolina;
- Provide a comprehensive program of education and enforcement strategies that will improve the safety of all bicyclists and pedestrians;
- Institutionalize bicycle and walking considerations to enhance current transportation practices at the state, regional, county and local level;
- Identify and promote new and innovative ways to advance bicycle and pedestrian safety and enjoyment through research and needs assessment;
- Encourage bicycling and walking as viable transportation options.

North Carolina's Clean Air Bill

The North Carolina Clean Air Bill, signed by Governor Jim Hunt in 1999, created a broadly sweeping initiative to improve air quality in North Carolina. In addition to establishing goals for reducing NO_x emissions and requiring low-sulfur gasoline, the bill provides for the following initiatives that are directly related to transportation energy efficiency:

- expands and improves I/M (inspection and maintenance) programs, increasing the likelihood of greater energy efficiency for automobiles in urban areas.
- directs NCDOT to consider emissions reductions in the design of transportation projects, leading to greater energy efficiency for automobiles using new transportation projects.
- sets goals for the state motor fleet to purchase low-emission or alternate fuel vehicles and encourages the use of low-emissions vehicles for public school and transportation systems.

North Carolina's Sensible Greenhouse Gas Reduction Strategies

This document from January 2000 proposed strategies that would reduce greenhouse gas emissions from a number of economic sectors, among them transportation. Strategies proposed to reduce greenhouse gas emissions are also those strategies that increase energy efficiency. The goal of the plan was to reduce greenhouse gas emissions to a 7% reduction below the state's 1990 emissions by the year 2012.

Southern Air Principles

These principles are a set of goals and objectives for the states in the Southeast. The transportation-related goals of the Southern Air Principles can be grouped into three categories: Alternative Fuels, Regional

Transportation Initiatives and Heavy-Duty Vehicle and Equipment Initiatives. The alternative fuel goals focus primarily on state and local government fleets, creation of alternative fuel infrastructure for public and private consumption, and the regional promotion of alternative fuel research and development. The regional transportation initiatives focus on enhancing the availability of rail and intercity bus systems throughout the south, thus making these modes an attractive alternative to the automobile. While the alternative fuel and regional transportation initiatives focus either wholly or partly on public travel, the heavy-duty vehicle and equipment initiative focuses strictly on the public sector and use of diesel fleets at the state and local levels.

Proposed Legislation: HB 1213 (2001-2002 Session) Rebate and Grant Program for Alternative Fueled Vehicles

Complementing the Southern Air Principles, HB1213 provides incentives for the public to either purchase Alternative Fueled Vehicles or retrofit existing vehicles to "AF" status. The bill calls for rebates, grants and educational efforts to help increase the share of Alternative Fueled Vehicles and infrastructure throughout the state.

The rebate program covers the following alternative energy sources:

1. Electricity
2. Compressed or liquefied natural gas
3. Propane
4. Hydrogen
5. Ethanol (E85 or E10 mixtures)
6. Bio fuels

If 50% of the 5 million drivers in North Carolina achieved a 5-mile reduction 250 days per year, they would succeed in reducing VMT 3.4 billion miles per year – 4.2% of statewide mileage of 80 billion miles. Such a reduction may indeed serve as an upper limit for achieving reductions in VMT.

Funding levels are $7 million for the first year ($1.00 per vehicle) rising to $17 million per year by the tenth year.

Rebates differ on gross weight of vehicle and type of alternative fueling. A maximum of $30,000 annually is available for AFVs weighing less than 8,500 pounds gross weight in the following manner:

1. 80% of the incremental cost for a dedicated vehicle, up to $5,000 maximum per vehicle;
2. 50% of the incremental cost for a bi-, flex-, or hybrid fuel vehicle, up to $5,000 maximum per vehicle (availability of fuel source must be demonstrated prior to payment of rebate);
3. 20% of the purchase price of a low-speed vehicle (20-25mph), or $1,000, whichever is less; and
4. 10% of the purchase price of all other dedicated AFVs and hybrid vehicles up to $5,000 per vehicle.

For vehicles weighing more than 8,500 pounds gross weight, the maximum annual rebate is $100,000 under the following restrictions:

1. 80% of the incremental cost for a dedicated vehicle up to $25,000 per vehicle;
2. 50% of the incremental cost for a bi-, flex-, or hybrid fuel vehicle, up to $25,000 maximum per vehicle (availability of fuel source must be demonstrated prior to payment of rebate);
3. 20% of the purchase price of a low-speed vehicle (20-25mph), or $1,000, whichever is less; and
4. 10% of the purchase price of all other dedicated AFVs and hybrid vehicles up to $25,000 per vehicle.

Current Grant Programs

Funds would also be available under SB-H1213 for alternative fuel infrastructure projects, administered by the State Energy Office. The infrastructure projects are intended to benefit the public directly or indirectly by being accessible to the public, to serve vehicles used by the public or for the general public welfare through reduced emissions.

1. Up to $500,000 for half the cost of an AF infrastructure project selected by the State Energy Office.
2. Up to $500,000 annually for three quarters of the cost of an ethanol infrastructure project.
3. Residual funds will be made available to state agencies for AF infrastructure projects.

Proposed Transportation Energy Policy

Reducing VMT

One way to envision the impact of reducing VMT is to assess what types of actions would have a major impact on energy use in the state. A major obstacle is that 50% of the total mileage in North Carolina remains rural where mass transit options, increased pedestrianism, and telecommuting, are generally less appropriate options.

Consider the impact of an aggressive, statewide VMT reduction program. If 50% of the 5 million drivers in North Carolina achieved a 5-mile reduction 250 days per year, they would succeed in reducing VMT 3.4 billion miles per. Such a reduction may indeed serve as an upper limit for achieving reductions in VMT.

A policy concept that could potentially have widespread impact on transportation efficiency is VMT Fees. However, implementing a VMT Fee program is at best, politically controversial and is unlikely to be passed in North Carolina. VMT fees apply to overall travel, as opposed to strategies such as road pricing that account for travel along certain routes or at certain times of the day. Some feel that VMT fees are a form of tax. The fees could be applied through periodic odometer readings, either as a part of annual vehicle inspections or when the vehicle's title changes hands.

The State Energy Office should work with the Department of Transportation to develop a coordinated set of strategies intended to reduce VMT by state government employees.

One of the trickier, and less politically palatable, elements of VMT fee policies is determining the fee structure. One approach is to apply the fee to all VMT for all vehicles. Another mechanism is to determine an average baseline mileage above which the fee would apply. To further encourage lower VMT, the fees collected for those traveling above the baseline mileage could be refunded to those below the baseline. In effect, those who travel excessively are paying for the social costs associated with that excess travel. Those who are not imposing those excess costs are being rewarded. The state, in effect, is acting as the middleman and coordinating these payments.

State Government Incentives for VMT Reduction

The State Energy Office shall work with the Department of Transportation to develop a coordinated set of strategies intended to reduce VMT within state government. Options include:

- Carpooling and vanpooling development, promotion, and coordination
- Telecommuting policies for state employees
- Use of alternative fuels in public fleets
- Guidelines for proximity of state buildings to mass transit
- Driving and idling procedures for vehicles involved in state construction projects

Table 10-3: Energy Savings from Employee Commuting

Average Round-Trip Commute:	20 miles
Average Miles per Gallon:	20 MPG
Average Gallons per Day Saved:	1 gallon per day
Days per Year Commuting:	150 days
Gallons per Year Saved:	150 gallons

Increasing Mass Transit Use

Mass transit systems can be much more efficient than automobiles. For example, a standard, 40-passenger bus averages about 4 miles per gallon of fuel. If the bus is half-full, it will therefore get 80 passenger miles per gallon (4 miles per gallon for the 20 passengers). Of course, a car with 4 riders that gets 20 miles per gallon will also get 80 passenger miles per gallon. However, average occupancy levels on buses in North Carolina's cities only yield about 40 passenger miles per gallon. Therefore, mass transit can theoretically be less efficient than an automobile with two passengers.

Some policies that could increase use of mass transit are:

Provide a state tax credit to individuals for a percentage of mass transit fees . . .

Provide an incentive to companies that provide employee inducements for mass transit use

- Provide a state tax credit to individuals for a percentage of mass transit fees for qualifying mass transit systems. Such a program could require the use of fare cards, kept on file by the taxpayer after use, to help avoid fraud. The tax credit should have an annual cap of $150.
- Provide an incentive to companies that provide employee inducements for mass transit use such as
  - income tax credit for 50% of incentive payments to employees who commute via mass transit with a maximum cap of $100 per employee per year (Table 10-3 shows average annual savings of 150 gallons)
  - develop statewide voluntary transportation efficiency program that awards companies that qualify with publicity and promotion

Expanding Mass Transit Systems

A successful VMT reduction program would require a seamless multiphase transition. Each step must be as convenient as possible. For example, for someone to convert from commuting by personal vehicle to mass transit, the mass transit system must be accessible, relatively inexpensive, safe, and require a minimum of transfers. One obvious limitation is that our dispersed residential development patterns make affordable mass transit systems difficult due to lower density development.

To make mass transit more cost effective and allow fewer stops in these situations, the state can fund and construct park-and-ride lots associated with transit-oriented development. Additionally, attention can be paid to "kiss-and-ride" arrangements that utilize drop off locations directly adjacent to transit access.

The above conditions for increased mass transit ridership require substantial investment in mass transit systems around the state. There would have to be widespread support for mass transit and a virtually assured market to justify the substantial investment necessary.

Being consistent with other statewide and regional policies, the encouragement of increased transit investment would be beneficial. By increasing the amount of transit investment, mass transit can become more attractive relative to traditional forms of personal transportation. If mass transit is affordable, reliable and desirable by paying attention to issues of timeliness, safety and comfort, the commuting public will be more likely to utilize state transit investments.

- Fixed routes may become more flexible, thus more able to serve larger segments of the population and a larger spatial area. This is an especially important consideration in North Carolina cities where urban structure generally dictates a very inefficient transit service.
- In addition to flexible routing, scheduling must become more flexible or "demand-responsive." In order to create a more demand responsive transit network, transit infrastructure must be scaled down from large buses to smaller vans.
- Existing transit services can be enhanced through more attractive buses. One long-standing complaint among those who choose not to travel by bus is the perceived lack of amenities and comfort, or the opinion that transit is not "classy" enough.
- Where feasible, light rail systems may be implemented to serve and direct development along corridors. This is a particularly important effort, as Charlotte and the Research Triangle area are preparing to invest in such systems. Encouraging the implementation of these projects will significantly advance North Carolina's efforts to create a practical, reliable mass transit system.

North Carolina shall require a 20% reduction in petroleum use by state government fleets by December 2006. . . .

The North Carolina legislature should also express its full support to the national Congress for a revised CAFE standard. . . . .

North Carolina shall institute an incentive program for highly efficient vehicles

Land Use Measures and "Smart Growth".

Land use practices can reduce VMT in a number of ways. Encouraging the increase in density brings (by definition) origins and destinations closer together, thus potentially reducing the travel distance. Simultaneously increasing the "mix" of uses in more dense areas makes locations much more accessible and less reliant on automobile travel. An effective State Energy Plan would adopt Smart Growth principles that are aimed at making areas more livable. Some of the more popular land use measures that can be thought of as affecting transportation and travel are policies such as Traditional Neighborhood Development and Transit-Oriented Development.

Traditional Neighborhood Development (TND) attempts to turn around decades of development policies that can be attributed to "suburban sprawl." That is, wide residential streets, the emphasis of the automobile and the de-emphasis of walking and biking, cul-de-sacs, and the large-scale segregation of otherwise compatible land uses that are kept apart because of outdated zoning regulations. Creating a neighborhood or community around mobility and accessibility is not only sound planning, but also sound business sense. If consumers can easily and comfortably access shopping areas by foot, they will be more likely to frequent the markets close to home, thereby reducing VMT and supporting neighborhood businesses.

Transit-Oriented Development (TOD) focuses development on transit nodes, or those areas where the routes of a single or multiple modes of transportation meets. The development surrounding these nodes is more dense and more mixed than it otherwise would, encouraging residential and economic activity to occur within a small spatial extent. While TODs may be thought of as largely self-sufficient, they are also an opportunity to attract park-and-ride facilities to encourage multimodal trips as well as attract the economic activity potential of these "non-local" travelers. TODs can be encouraged as "infill" development, or development in an already urbanized area, or they may also be incorporated into new suburban development.

Whether a locality embraces TND or TOD as a development paradigm, or merely makes sure they are aware of the transportation impacts of individual developments within their jurisdiction, the potential that proper land use planning principles have to affect transportation cannot be understated.

The State Energy Office shall develop an outreach program on Smart Growth principles and case studies to present to local planning officials and other stakeholders such as interest groups with an environmental and economic focus as well as the general public. It would be wise for the SEO to partner with NCDOT, Smart Growth NC and other transportation study groups in developing this program. In addition, ***the energy office shall develop a competitive grant process in which communities, towns, counties, and cities can develop community redesign projects that incorporate Smart Growth planning concepts. The State Energy Office shall also develop a publication on Smart Growth and Energy Efficiency that emphasizes the many advantages of the Smart Growth concept.***

The State Energy Office shall develop an outreach program on Smart Growth principles and case studies to present to local planning officials and other stakeholders.. . . the energy office shall develop a competitive grant process in which communities, towns, counties, and cities can develop community redesign projects that incorporate Smart Growth planning concepts. . . . develop a publication on Smart Growth and Energy Efficiency which emphasizes the many advantages of the Smart Growth concept.

Increasing Vehicular Efficiency

Figure 10-6 shown earlier on Page 11-10 illustrates that the overall fuel efficiency of the transportation sector has increased in recent years. However, because VMT per driver have increased at a greater rate, overall energy use in the sector has increased about 1.1% annually. Thus, in order to reduce overall vehicular energy use, the state needs to accelerate improvements in efficiency basically measured in units of miles per gallon.

National legislation has set CAFE (Corporate Average Fuel Efficiency) standards for the major automobile manufacturers that set a minimum fleet average efficiency, measured in miles per gallon. Several bills in the national Congress have proposed raising the minimums in order to increase vehicle efficiency, reduce oil imports, and lower air pollution. The North Carolina legislature should express its full support to the national Congress for a revised CAFE standard. Since automotive air emissions are integrally linked to the degradation in air quality of North Carolina's growing urban areas, the state would certainly benefit from an improvement in vehicular efficiency. Improving vehicular efficiency will improve public health, free-up personal income not spent on less-efficient modes of transportation, and indirectly make North Carolina a desirable place for persons and businesses to locate.

North Carolina cannot realistically mandate the efficiency of vehicles in the state, such as the national CAFE standard does. However, a variety of policies could accomplish an improvement in efficiency:

- Mandate efficiencies for state and local government's vehicle
- Develop incentives for improving efficiencies of fleets operated by local governments and private companies
- Develop incentives for individual and private sector fleet efficiencies
- Improve efficiency of roadway and traffic control systems

North Carolina shall require a 20% reduction in current petroleum use instate government fleets by December 2006. The North Carolina State Energy Office will work with the Departments of Administration, Transportation, and Public Safety to establish the current baseline efficiency for each division of state government and set efficiency improvement goals in order to achieve the overall 20% reduction. Because the transportation needs differ among the wide array of activities of state government, the efficiency goals may differ by agency.

North Carolina shall require a 20% reduction in current petroleum use instate government fleets by December 2006..

At present, state government offices maintain about 8,000 vehicles in their vehicle fleets. Each vehicle accumulates about 16,000 service miles per year and uses about 6 million gallons of gasoline. Average vehicular efficiency is about 20.9 miles per gallon. About 300 of the vehicles run on ethanol fuel; however, the state Department of Transportation only maintains two ethanol fueling stations, one in Raleigh and one in Wilmington.

A ruling last year potentially decreased the efficiency of the state motor fleet. State policy increased the mileage before replacement to 110,000 instead of the previous 90,000 miles.

If the efficiency of the above vehicles improved 20%, the state would save about 140 billion Btu per year. While the total savings is a small fraction of the state total of 500 Trillion Btu annually, it is critical for state to "lead by example" by adopting programs for decreasing transportation energy use.

North Carolina should also approve a grant program structured as follows:

- $250 payment per new vehicle for company and government fleets whose efficiency improves over 20%
- $250 payment to automotive retailers for each vehicle sold whose efficiency is greater than 45 miles per gallon

System Efficiency

The North Carolina State Energy Office, working jointly with the North Carolina Department of Transportation and local governments, shall conduct a research study into the costs, energy savings, other benefits, and specific policy recommendations for decreasing congestion on state roadways.

Transportation system efficiency attempts to create a freer flowing network, which in turn reduces gasoline consumption and emissions. Steady flows of traffic are not accelerating or decelerating, and thus remain at their most energy efficient. Efficiency can be thought of from two perspectives: managing the demand for travel and managing the supply of transportation infrastructure. ***The North Carolina State Energy Office, working jointly with the North Carolina Department of Transportation and local governments, shall conduct a study into the costs, energy savings, emissions reductions, and specific policy recommendations for decreasing congestion on state roadways by means other than road construction.*** Non-energy related benefits include reducing environmental and human health risks.

Alternative Fuels

The state has directed considerable attention to alternative fuels and alternative fueled vehicles. As described previously, the Clean Air Bill and legislation currently under consideration (HB 1213) provide some incentives for development of the industry. The key to success is to plan carefully for evolution of alternative fuels so as to benefit the citizens of North Carolina. There are three key elements:

- Development of adequate alternative fuels for transportation and other demands. The Renewable Fuels Association expressed confidence that the ethanol industry could meet the state's demands for alternative fuels. However, one key benefit driving the program in the state is agricultural development in North Carolina. Alternative fuels would not be viewed as positively if based on a fuel imported from other states.
- Provision of fueling infrastructure. If the use of alternative transportation fuels are to expand, there must be more fueling stations. Proposed legislation provides matching grants for construction of more retail outlets throughout the state for alternative fuels.

- Finally, there must be growth in the number of alternative fueled vehicles on the road using the new fueling stations that in turn are demanding fuels derived from biomass.

North Carolina should pass HB 1213 to provide incentives for a more diverse fuel supply for the state's vehicles. The state shall also convert at least 50% of its fleet to alternative fueled vehicles by 2005 and 100% by 2010.

Because substantial growth in vehicles that use alternative fuels may raise air pollution issues, and production of fuels in North Carolina remains a complex issue from both an agricultural and conversion facility perspective, the State Energy Office will establish a panel to lead a detailed assessment of the potential for an alternative fuels industry in North Carolina. The assessment shall take an objective look at the potential for the growth of biomass fuels in the state, the economic and environmental impacts of conversion facilities, how quickly infrastructure can grow and provide a positive return for investors, and what the overall impacts of increased combustion of alternative fuels in vehicles will be on the state's economy and environmental.

North Carolina should pass HS 1213 to provide incentives for a more diverse fuel supply for the state's vehicles.

The state shall also convert at least 50% of its fleet to alternative fueled vehicles by 2005 and 100% by 2010.

Because substantial growth in vehicles that use alternative fuels may raise air pollution issues, and production of fuels in North Carolina remains a complex issue from both an agricultural and conversion facility perspective, the State Energy Office will establish a panel to lead a detailed assessment of the potential for an alternative fuels industry in North Carolina.

Conclusion

The transportation sector uses more energy than the residential, commercial, or industrial sectors individually; therefore, it is vital to the success of the goals of the State Energy Plan. Historically, there has been less economic incentive for individuals, businesses, and governmental entities to reduce transportation energy use. While buildings and industry can see a direct link between an investment in a more efficient device, product, or practice and savings on energy bills, purchasers of vehicles are not used to comparing energy costs of different products. Also, vehicles differ in so many ways that energy efficiency is almost an insignificant item during the sales process. Costs such as a car's purchase price, registration and insurance are immediately recognizable to consumers, there are many hidden and intangible costs that are not factored into a purchase. These costs include decreased air quality, noise, inefficient land consumption due to road infrastructure and time-costs associated with congestion.

The overall goal of the State Energy Plan's policy toward transportation is to increase the use of efficient vehicles and alternative fuels. The state's fleets can have higher efficiency and increased use of alternative fuels. Incentives may move employees and their employers to favor use of mass transit, as well as more efficient fleet vehicles. Incentives and publicity programs that are practical and affordable will shift consumers to select vehicles that provide higher miles per gallon.

Secondarily, the State Energy Plan encourages more transportation-efficient land use patterns that can reduce the amount of driving and increase the options available to the traveler.

It should be a priority of the State Energy Office to work in concert with NCDOT to insure that policies and programs pertaining to alternate fuel use, mass transit and transportation planning are implemented as soon as

possible. In fact, the State Energy Office can take the lead as a catalyst for bringing together the variety of plans and policies already drafted by numerous agencies and entities in the state of North Carolina.

By taking action on this plan and maintaining visibility through education and outreach, the State Energy Office should be able to garner a reputation as a leader in promulgating energy efficient transportation options – and area in which it currently has little visibility. By doing so, it can serve the citizens of North Carolina by helping to provide a transportation system with more options and opportunities, a more vibrant and sustainable economy, and a cleaner and healthier place we can all call home.