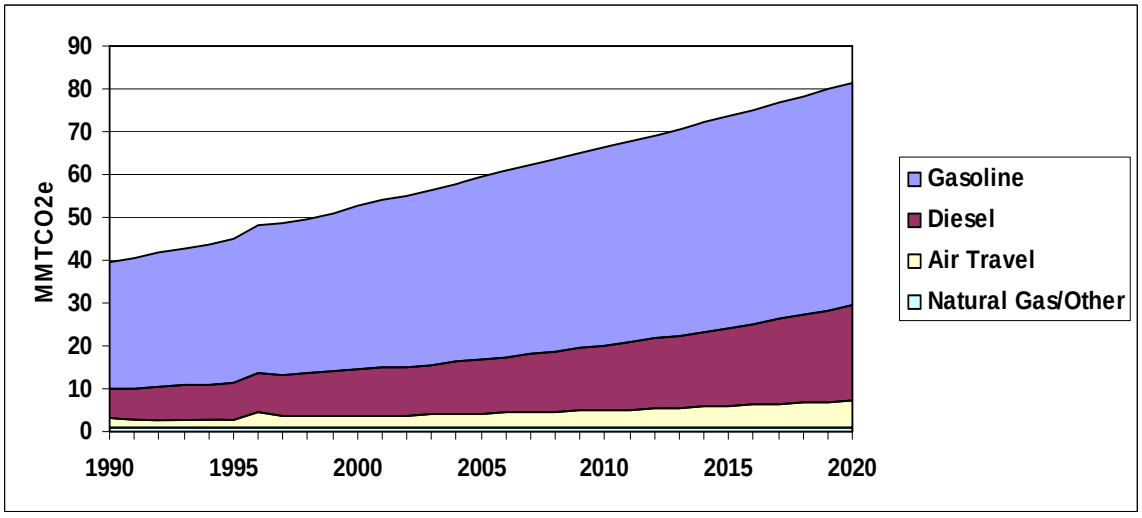
Chapter 5
Transportation and Land Use

Overview of GHG Emissions

The transportation sector is a major source of GHG emissions in North Carolina—currently accounting for 29% of the State's gross GHG emissions. Transportation emissions are determined by technologies, fuels, and activity rates. Activity rates, in turn, are determined in part by population, economic growth, and land use choices that affect the demand for transportation services. GHG emissions from the transportation sector totaled about 52.7 $MMtCO_2e$ in 2000.

Figure 5-1 shows historical and projected Transportation and Land Use (TLU) GHG emissions by fuel and source, and illustrates their rapid growth. TLU emissions are expected to more than double from 1990 from 2020. On-road vehicle miles traveled (VMT) are forecast to continue to grow faster than the population, and rapid growth in freight VMT is also expected. The high overall growth in transportation sector emissions suggests many opportunities and challenges for reducing North Carolina's GHG emissions.

Figure 5-1. Historical and projected GHG emissions from the Transportation and Land Use Sector, North Carolina, 1990 to 2020



Key Challenges and Opportunities

Options for reducing emissions from transportation fall into three categories:

1. Reducing GHG emissions per vehicle mile traveled,
2. Reducing the carbon intensity of fuels, and

3. Reducing activity rates, either absolutely or relative to the baseline. Policies may produce modal switches to lower-emission means of travel, and/or decrease the total amount of travel.

North Carolina has substantial opportunities to reduce emissions in each category:

- In North Carolina and in the nation as a whole, vehicle fuel efficiency has improved little since the late 1980s, yet many studies have documented the potential for substantial increases consistent with maintaining vehicle size and performance.
- The use of fuels with lower GHG emissions is growing and larger market penetration is possible.
- North Carolina also has taken steps to increase transit options and plan for growth that reduces emissions, but the state can absorb its rapid growth in development patterns that will produce far less travel, and far lower emissions than forecast.

Overview of Mitigation Recommendations and Estimated Impacts

The Climate Action Plan Advisory Group (CAPAG) recommends a set of 13 mitigation options for the Transportation and Land Use sector that offer the potential for major economic benefits and emissions savings. As summarized in Table 5-1, these mitigation recommendations come from each of the available reduction categories above, and could lead to emissions reductions from reference case projections of 25.5 $MMtCO_2e$ per year by 2020, cumulative savings of 232 $MMtCO_2e$ from 2008 through 2020, and net cost *savings* of over $4.3 billion to the North Carolina economy through the year 2020 on a net present value basis (NPV).[1] The weighted average cost of saved carbon from the mitigation options for which quantitative estimates of both costs and savings were prepared was –$19 per metric ton of CO_2 equivalent.

The estimated impacts of the individual mitigation options are shown in Table 5-1. The CAPAG mitigation recommendations described briefly here (and in more detail in Appendix G) result not only in significant emissions and costs savings, but offer a host of additional benefits as well. These benefits include (but are by no means limited to) reduced local air pollution, more livable, healthy communities, and increased transportation choices.

In order for the TLU mitigation options recommended by the CAPAG to yield the levels of savings described here, the options need to be implemented in a timely, aggressive, and thorough manner. To be most effective, the group of mitigation options aimed at VMT reductions and increased transportation choices (TLU-1a, Land Development Planning, and TLU-1b, Multi-Modal Transportation and Promotion) will require change at every level of government, and as such will be most effective with focused leadership by the State, including training, outreach, and technical assistance to local governments and businesses (either directly or via local governments). For example, TLU-1b, Multi-modal Transportation and Promotion, includes one of the empirically most powerful ways to reduce emissions, employer-based commute benefits. Among businesses that implement them, these are very popular and cost-effective. Yet for a

[1] The net cost savings are based on fuel expenditures, operations, maintenance, and administrative costs, and amortized, incremental equipment costs. All NPV analyses here use a 5% real discount rate.

variety of reasons, businesses implement these benefits at a much higher rate with government technical assistance.

Next, the State Clean Car program must clear several hurdles before North Carolina or any other state can adopt it, including EPA approval of the original California Clean Car Program (that other states can then opt into) and a court challenge to the underlying notion of regulation of GHG emissions from vehicles. If for any reason North Carolina is not able to implement the Clean Car Program, other options would need to play a larger role if the State is to meet its emissions reduction goals. For example, the mitigation options under the Rebates/Feebates Options Bundle (TLU-3b) could substantially improve fuel efficiency through market mechanisms and consumer labeling. Feebate proposals usually have two parts: (1) a fee on relatively high emissions vehicles; and (2) a rebate or tax credit on low emissions vehicles.

As a final example, Pay-As-You-Drive Insurance would require the State to not only allow insurance companies to offer customers a way to save each time a customer chooses to drive less, but also to promote that option, if the State is to see the levels of adoption analyzed here.

Most of the recommended mitigation options would produce substantial economic benefits for North Carolina. The sources, and calculations, of these benefits are detailed in Appendix G. Because the form of several of the recommendations leaves the State and its constituents substantial latitude in how to act to achieve the recommended goals, it was not possible to estimate financial costs and benefits for all options.

For example, TLU-1a recommends that the State's local jurisdictions develop growth plans. Given the substantial portion of forecast emissions growth driven by increasing driving, growing in more compact, mixed-use patterns is simply essential to meeting the State's emissions reduction targets. For the same reason, changing development patterns also offers the single largest potential emissions reduction from transportation. Each jurisdiction can develop its own approach to planning for growth, and because we cannot know which approach each will choose, we cannot estimate the cost for each, or, as a result, the likely total cost. In the case of TLU-1a, CCS reviewed experience in, and estimates for, growth planning in other states. With few exceptions, experience and forecasts across a wide variety of planning choices show *substantial* net cost savings from planned growth relative to the kind of growth now prevalent in North Carolina. North Carolina and its communities would likely save billions of dollars from shorter sewer lines, fewer needed new roads, and fewer new schools. But given the wide range of choices available to North Carolina communities under recommended TLU-1a, it is not possible to put a point estimate on the benefits that will likely be produced by those choices

The benefits from other recommended options were more straightforward to forecast. The technology required in TLU-5, tailpipe GHG standards for example, would more than pay for itself in reduced fuel consumption, while substantially reducing North Carolina's GHG emissions.

Cost Savings

Several of the TLU options (below) show higher estimated net savings than most other options both in and out of TLU. This subsection summarizes *briefly* the source of those estimates.

TLU-1b. Multi-Modal Transportation and Promotion

A wide variety of empirical experience suggests that the policies and investments listed in the Option Design and Implementation Mechanisms sections are likely to produce substantial net savings, as in the following four examples.

1. *Transit investments generally*

   Nationally, transit produces net economic returns on investment: "For every $10 million invested, over $15 million is saved in transportation costs to both highway and transit users. These costs include operating costs, fuel costs, and congestion costs."[2]

   At a high level, then, the benefits of the proposed investment in transit can be estimated as follows:

NC DOT budget:	$2.5 billion/year
13%	$325,000,000/year
× 1.5 savings multiplier	$487,500,000/year in savings
–cost of investment	$325,000,000/year
Total benefits	**$162,500,000/year**

   This substantial return on investment is the basis for the cost savings number reported in the summary table. Without knowing more about how North Carolina will make its transit investments, it is not possible to do a finer-grained analysis. However, *the following examples suggest that the 1.5x savings multiplier may be conservative*. [Portions of the following sections dealing with a possible savings multiplier are italicized.]

2. *Transit fare initiatives*

   Unlimited Access transit at the University of California-Los Angeles costs $810,000 a year, and has total benefits of $3,250,000 a year,[3] *a return on investment of more than 4x*. Similar programs at other universities show similar results.[4] The many educational institutions in North Carolina could see similar savings.

   Universities are in some senses unique institutions, but the general types of challenges (especially demand for, and costs of providing, parking), and the types of benefits enjoyed in response to commute benefits programs, are equally available to businesses. A report on this topic notes:

   > "Eco Passes also offer significant advantages for employers who offer free parking to all commuters, because those who shift from driving to transit will reduce the demand for employer-paid parking spaces. A survey of Silicon Valley commuters whose employers offer Eco Passes found that the solo-driver share fell from 76 percent before the passes were offered to 60 percent afterward. The transit mode share for commuting increased from 11 percent to 27 percent. These mode shifts reduced commuter parking demand by approximately 19 percent.

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[2] Cambridge Systematics, Inc., *Public Transportation and the Nation's Economy: A Quantitative Analysis of Public Transportation's Economic Impact,* 1999.

[3] Jeffrey Brown, Daniel Hess, and Donald Shoup, "Fare-Free Public Transit at Universities: An Evaluation," *Journal of Planning Education and Research* 23:69–82, 2003.

[4] Jeffrey Brown, Daniel Hess, and Donald Shoup, "Unlimited Access," *Transportation* 28:233–267, Kluwer, 2001.

"Given the high cost of constructing parking spaces in the Silicon Valley, *each $1 per year spent to buy Eco Passes can save between $23 and $333 on the capital cost* of required parking spaces."[5]

3. *Transit and non-SOV options information and promotion:* Per public dollar, a Transportation Management Organization (TMO) can *accommodate seven times as many commuters as new highway investment.*[6]

4. *TDM investments on the basis of avoided driving:* This policy is estimated to reduce VMT by 3,317,688,733 in 2012, and 3,970,779,011 in 2020. The current IRS-estimated cost of driving a mile in a personal vehicle is $0.485. At that rate, total savings will be

	2010	**2020** (constant $)
VMT reduced	$3,317,688,733	$3,970,779,011
@ $0.485 / VMT, Avoided costs =	$1.6 billion	$1.9 billion
–Cost of investment	$325,000,000	$325,000,000
Net savings	**$1.2 billion**	**$1.6 billion**

Thus, the estimated $162,500,000/year in total savings for this Option used for the summary table is very conservative.

TLU-3a. Surcharges to Raise Revenue

If, as in the above example, revenue is used to fund multi-modal options promotion that reduces VMT, then we can estimate net benefits as shown below:

	2010	**2020 (constant $)**
VMT reduced	$1,850,000,000	$1,850,000,000
@ $0.485 / VMT, Avoided costs =	$897,250,000	$897,250,000
–Cost of investment	$37,000,000	$37,000,000
Net savings	**$860,250,000**	**$860,250,000**

If, in an effort to be conservative, we limit the savings to the 7× savings multiplier found in a study for Minnesota DOT, [7] then the net benefits fall as follows:

	2010	**2020 (constant $)**
Cost of investment	$37,000,000	$37,000,000
Avoided cost @ 7x investment	$259,000,000	$259,000,000
Net savings	**$222,000,000**	**$222,000,000**

We use this lower number in Table 5-1.

[5] Ibid., p. 260.

[6] Minnesota Department of Transportation, Modal Options Identify Project, "Measurement and Evaluation," 2006.

[7] Ibid.

TLU-5. Tailpipe GHG Standards

A review of $/ton estimates prepared for the California Clean car-type regulation for California Air Resources Board (CARB), Northeast States for Coordinated Air Use Management (NESCAUM), and CCS produces an estimate of between $117 saved for each metric ton of CO_2e reduced at the high end, and roughly a third of that (~$38 saved for each ton) at the low end. We used the low end in an effort to be conservative. This figure takes into account not only the higher initial cost of the California Clean Car, but also the costs of financing that car. Both the higher costs and the savings from reduced fuel consumption would start immediately upon purchase, and CARB estimates that the net savings would begin immediately as well.

Table 5-1. CAPAG-recommended mitigation options and results for the Transportation and Land Use Sector

Option No.	Mitigation Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2020 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support*
		2010	2020	Total 2008–2020			
TLU-1a	Land Development Planning	2.6	8.0	58.2	*Net savings*		SMJ
TLU-1b	Multi-Modal Transportation and Promotion (formerly TLU-2)	3.7	5.8	52.4	–1,300	–25	UC
TLU-3a	Surcharges to Raise Revenue	1.2	2.2	15.7	–1,800	–117	SMJ
TLU-3b	Rebates/ “Feebates” to Change Fleet Mix	0	<0.5	2.8	*Not quantified*	–40 to +10	SMJ
TLU-4	Truckstop Electrification	*Included in TLU-8*			*Net savings*		UC
TLU-5	Tailpipe GHG Standards	0	8.1	44.5	–1,690	–38	SMJ
TLU-6	Biofuels Bundle	1.9	4.5	35.4	*Not quantified*		UC
TLU-7	Procure Efficient Fleets	*Included in TLU-6*					UC
TLU-8	Idle Reduction/Elimination Policies	0.1	0.2	2.2	–6	–4	UC
TLU-9	Diesel Retrofits	0.3	2.2	13.5	*Not quantified*		UC
TLU-11	Pay-As-You Drive Insurance	2.3	5.3	42.0	*Expected net savings*		SMJ
TLU-12	Advanced Technology Incentives	*Not quantified*					UC
TLU-13	Buses – Clean Fuels	*Included in TLU-6*					UC
	SECTOR TOTAL AFTER ADJUSTING FOR OVERLAPS	11.1	25.5	232.3	–4,350	–19	
	REDUCTIONS FROM RECENT ACTIONS	0	0	0	0	0	
	SECTOR TOTAL PLUS RECENT POLICY ACTIONS	11.1	25.5	232.3	–4,350	–19	

* UC = unanimous consent (all agree); SMJ = super majority (at least 80% or more agree). TLU-2 was renamed TLU-1b because of its linkage to TLU-1a. There is no mitigation option TLU-10, because this catalog option was not advanced by the CAPAG.

Note that for TLU-5, the estimated emission reduction for each year from 2008 through 2020 was multiplied by the cost-effectiveness value of -$38/ton to estimate cost savings for each year, and then the cost savings for each year was discounted and summed to estimate the NPV. Thus, the cost-effectiveness value of –$38/ton cannot be replicated by dividing the cumulative cost savings by the cumulative emission reduction shown in this table.

Transportation and Land Use (TLU) Mitigation Option Descriptions

The Transportation and Land Use Sectors include emissions reduction opportunities related to reducing GHG emissions per miles of travel, reducing the carbon content of transportation fuels, and using transportation and land use policy to reduce the need to travel by high-emitting modes. Additional detail on each of the options summarized below can be found in Appendix G.

TLU-1a. Land Development Planning

The CAPAG recommends that North Carolina promote land planning and development that supports conservation of high quality natural and cultural resources and supports more compact development, and as a result reduces growth in driving and emissions. Do so by supporting and promoting private and public planning and development practices, including infrastructure provision, that reduce the number, length, or travel mode of trips made in North Carolina.

The suggested statewide goal is to reduce projected increase in VMT by 10% statewide by 2020. (Value was developed after review of targets in several other states, and an assessment by the group of the ability to meet the target.)

Meeting the goal will require diverse implementation tools. Providing many options, statutory changes, and program assistance for smaller communities will be essential.

Land Use and Development Legislation to Require Adoption of a Growth Plan

- *Each municipality and county shall develop a land use and development plan.*

  The plan should designate planned growth areas and natural resource areas within that jurisdiction and any extraterritorial jurisdiction for a planning horizon of at least 25 years. The land use and development plan should include standards and criteria for conservation area and/or urban service area designations to accommodate a minimum 20-year growth forecast agreed upon by the each county and municipality; establish development and conservation goals; recognize important natural and human resources; and, express appropriate policies, practices and strategies to implement these goals. Local planning programs should include appropriate public involvement processes to achieve consensus on the development and conservation vision for the community.

- *Require and support integration of transportation with land use plans.*

  Maryland, Minnesota, and Denver, CO, as well as the non-profit Triangle Land Conservancy have developed "greenprints" of areas that have old-growth forests, productive agricultural lands, water supply watersheds, historic sites or other critical and irreplaceable resources. Adding this as a required element of all transportation plans would be a simple and meaningful step that would greatly enhance the effect and benefits of NC GS 136-66.2 without requiring new zoning or regulatory powers. The November 2004 passage of tax increment financing legislation demonstrates that North Carolina can and does make room for new ideas that help achieve economic development goals in concert with infill

development objectives. The NC Small Town Economic Development (NCSTEP) initiative created grant funds that are being used in 33 communities to plan for growth and development in a way that will help those communities benefit from growth and minimize negative impacts.

Regulatory incentives such as withholding transportation funds for noncompliance have worked in Tennessee and should be considered in North Carolina as well.

TLU-1b. Multi-Modal Transportation and Promotion

The CAPAG recommends that the State work with its constituents to shift passenger transportation mode choice to lower emitting choices. Ensure that transportation is integrated with and appropriately serves land-use development plans (developed under TLU-1a). Implement the North Carolina transportation plan allocation of 13% of state transportation spending to transit.

Implement policies that increase use of public transportation, producing a shift to lower emitting mode choices, by the following policies:

- Improve Transit Service (frequency, convenience, quality).
- Expand Transit Infrastructure (rail, bus, Bus Rapid Transit).
- Focus new development on transit-served corridors (Transit-Oriented Development).
- Expand Transit Marketing and Promotion (including tax-free and employer-paid Commuter Benefits, and Parking Cash Out).
- Expand Transportation System Management and Design, which speeds both transit and other traffic.
- Improve bike and pedestrian infrastructure both as feeders and as stand-alone modes.
- Many programs are in place and are therefore immediately expandable/implementable. Enhancement and continuation can begin short-term. These implementation mechanisms include
    - Aggressively support and aid the creation of Regional Transportation Districts (RTDs). RTDs can sell bonds for capital projects, and member governments can levy taxes for operation and maintenance subject to voter approval.
    - Make planning and funding rules more flexible to allow transit operators to provide service to places outside of their municipal jurisdictions.
    - Abolish or reduce minimum parking requirements in zoning codes, and allow localities to establish parking maximums.
    - Create a best practice guide and recognize developers who adhere to best practice when designing and locating new private and public development.
    - Require planning to extend beyond 5 years (20 years recommended) for all systems.
    - Create incentives or require the purchase of biodiesel fuel (minimum: B20) as a part of all public bus replacement programs. Conover has already done so with great results.

- Location of State Facilities—Locate state facilities near transit facilities. Where and when appropriate/possible all state government offices should be located downtown. Similarly, provide transit to serve concentrations of state employees.[8]
- State Targeting of Infrastructure Investments—Legislatively appropriated capital outlay funds, state public revolving loan fund, and other state-funded infrastructure initiatives should be used for projects that encourage walkable and traditional communities, and are supportive of transit.
- Make maintenance of infrastructure a priority—Fix it First. Revise any state infrastructure programs; transportation, water, sewer, that fund new systems but not maintenance or upgrades for existing systems.
- Replace "average cost pricing" for utilities services with rate structures that charge full marginal costs for both new infrastructure and for water, sewer, electricity, and telephone service delivery.
- Fund the transportation-related programs in this mitigation option with monies generated by other mitigation options such as feebates and/or gas tax.

TLU-3a. Surcharges to Raise Revenue

The CAPAG recommends that the State vary motor vehicle registration fees by vehicle emissions to provide a surcharge on higher emitting vehicles.

This surcharge would raise funds for State of North Carolina to support transportation-related projects that reduce GHG. It would raise these funds through a mechanism that is directly tied to a significant source of GHG emissions from cars and trucks. It is not envisioned that the scale of the surcharge would affect the fleet mix; the goal of this policy is revenue-raising that is tied to emissions.

- 5.1 million North Carolina LDV registrations per year at an average of $7.25 per vehicle would produce $37 million per year for programs to reduce emissions from travel.
- The most efficient regionally funded regional commuter programs can reduce VMT for a cost of 2 cents/mile. Most regional commuter programs cost more per mile. On the other hand, few are as well funded as this proposal, and there are almost certainly economies of scale and scope.
- $37 million per year times $0.02 per mile equals 1,850,000,000 VMT = 2% of total statewide VMT; 3% of total urban LDV VMT.

TLU–3b. Rebates/Feebates to Change Fleet Mix

The CAPAG recommends that the State charge a sliding scale of fees and rebates for new light-duty vehicles based on their emissions of greenhouse gases and/or other measures of a vehicle's

[8] This is an Executive Order from North Carolina Governor James Holshouser.

environmental impacts. This will provide an incentive for manufacturers to sell cost-effective efficiency technologies, and for consumers to buy lower-emitting vehicles by

- Having price signals reflect emissions levels and thus have emissions levels more directly enter buying decisions, and
- Sending a signal to manufacturers to produce increasingly low-emitting vehicles for the market.

The revenue should be used to create a dedicated revenue stream for promotion of low emitting or no emitting GHG transportation alternatives (e.g., hybrid tax credits, transit infrastructure). In addition,

- Emissions could be considered relative to other vehicles within each class or across classes based on their design variations.
- The rebate/feebate could be set as a multiplier for an excise tax so that the fee or rebate is determined not only by the emissions rate of the vehicle but by its price as well.
- Generally the rebate/feebate design needs to be simple, minimize the number of pivot points, be well-documented, and be designed to maximize consumer attention.

A wide variety of economics literature finds that vehicle buyers do not buy all the efficiency technology that is cost-effective, taking into account the net present value of both the fuel savings and the additional technology cost. Feebate analyses find that the fuel savings that result from a feebate program would pay for additional costs, producing net cost savings:

> "The reduction in consumer surplus is more than compensated for by unvalued fuel savings that are realized. The benefits are positive for all rates up to $1000 but marginal costs begin to outweigh benefits between $500 and $1000. Adopting two or more classes reduces the benefits significantly while creating a relative subsidy for larger vehicles."

As a result: Net benefits range from $40 per ton for a low feebate, to $10 per ton for a high feebate.

TLU-4. Truck Stop (and Places Where Trucks Stop) Electrification

The CAPAG recommends that North Carolina reduce idling-induced emissions from heavy-duty diesel trucks by providing—or helping the market to provide—electrical hook-ups to power heating, cooling, and other needs while stopped.

North Carolina should analyze existing pilot projects at major truck stops on interstate highways (principally, I-40 and I-85) and initiate other efforts at other places where truck traffic is high; then, progress to include all major truck stops statewide with at least one multi-unit electrified stop in each of the 17 urban areas in North Carolina.

North Carolina has several TSE pilots in place. While programs are in discussion there are no policies or laws to enforce participation.

TLU-5. Tailpipe GHG Standards

The CAPAG recommends that North Carolina join with the 13 other states that have adopted the State Clean Car Program to reduce emissions of GHGs from vehicle operation.[9]

TLU-5 would use California Clean Car standards for cars and light trucks to reduce GHG emissions. California standards require GHG emissions reductions of about 30 % from new vehicles, phased in from 2009 to 2016, through a variety of means.[10] Other Clean Car Program elements include standards requiring reductions in smog- and soot-forming pollutants, and promoting introduction of very low-emitting technologies into new vehicles.

The General Assembly could enact legislation in 2009, at the earliest, unless tied to a 2007 bill carried over to 2008 so that North Carolina can implement the California standards.[11]

TLU-6. Biofuels Bundle

The CAPAG recommends that the State work to increase market penetration of biofuels in North Carolina by a mixture of policies (voluntary and/or mandatory) to achieve feasible goals—offsetting fossil fuel use (gasoline) with production and use of starch-based and cellulosic ethanol.

Replacing gasoline with ethanol can reduce GHG's to the extent that the ethanol is produced with lower GHG content. Biodiesel has a lower GHG content than fossil diesel, so using biodiesel instead of fossil diesel reduces GHG emissions.

This option is linked with policy options AFW-2, Biodiesel Production, and AFW-6, Policies to Promote Ethanol Production. This option seeks to develop the demand for biofuels, whether produced locally or out-of-state. (Options AFW-2 and AFW-6 pursue the GHG benefits achievable beyond TLU options by promoting in-state production of ethanol and biodiesel using feedstocks and production methods with greater GHG benefits than the likely business-as-usual national market production methods, e.g., conventional starch-based ethanol.)

The goals for this policy should be phased in utilizing biofuels to replace the specified percentages of gasoline and diesel consumed for transportation throughout North Carolina by the specified years, as shown Table 5-2, below. The goals of this policy can be achieved through a combination of a renewable fuels standards, financial incentives, outreach, and market-based mechanisms.

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[9] Also known as the "Pavley" standards (after Assemblywoman Fran Pavley who introduced the legislation) or "California GHG emission standards."

[10] For detailed information, see: http://www.arb.ca.gov/cc/ccms/ccms.htm

[11] The California standards currently are being litigated, and timing may be affected as a result. Recent court decisions have found that CO_2 can be a pollutant under the Clean Air Act (CAA). Many observers see this as clearing the way for the required EPA waiver under the CAA.

Table 5-2. Goal levels and timing for biofuels implementation

Phase	Year	Percentage of Gasoline to be Replaced by Biofuels	Percentage of Diesel to be Replaced by Biofuels
1	2010	10% (E10 equivalent)	5% (B5 equivalent)
2	2015	15% (E15 equivalent)	10% (B10 equivalent)
3	2020	20% (E20 equivalent)	15% (B15 equivalent)
4	2025	25% (E25 equivalent)	20% (B20 equivalent)

The CAPAG recommends pursuing these goals through the following mechanisms:

- Pursue DOE and State funding for more alternative fuel pumps throughout the State and for introducing appropriate infrastructure throughout the State. Some federal tax incentives currently exist for the purchase of alternative fuel vehicles. When the federal incentives expire, examine the feasibility/need to continue such incentives for alternative fuel vehicles.
- Reduce or eliminate the motor fuels tax on biodiesel and ethanol (E85). Develop a system to provide for monthly credit for biodiesel and E85 blended fuel that would be equivalent to the state motor fuels tax owed on the biofuels portion of the fuel blend. (This could follow in the wake of elimination of tax on "home brew" biodiesel by 2007 legislature.)

  Monthly tax credits would be claimed on the same form (Biodiesel and Fuel Alcohol Providers Form) marketers currently file with the North Carolina Department of Revenue (DOR) Motor Fuel Tax Division to pay fuel tax. This would reduce pump price of Biofuels as marketers would pass most of the credit on to consumers to be competitive. Credits could be paid out of General State Revenues, DOT highway funds. Credit would be revenue neutral as it would be equal to the tax that would have been paid by marketers for biofuel portion of blend.

- Develop a $0.25/gallon credit for biodiesel and ethanol use in North Carolina vehicles.

  As above, the tax credit would be claimed on the DOR Biodiesel and Fuel Alcohol Providers Form. Similarly, this would reduce price of Biofuels as marketers pass the credit on to consumers in order to be competitive. General State Revenues, or DOT highway funds could pay for the credit. Unlike above, this credit would not be revenue neutral as the state would be providing incentive for fuel sold to non-taxable entities (local and state government) as well as sales to taxable entities. However, only the biofuel portion of blended fuel would be eligible for 25-cent credit. For example a B20 blend would get a 5-cent credit.

- Create a tax credit for biodiesel producers.
- Develop a mandated Renewable Fuel Standard (RFS), corresponding to the penetration rates listed above.

  The RFS should include a cost trigger, so that if the cost of alternative fuels exceeds conventional fuels by more than a specified amount, the RFS would be temporarily removed. The cost trigger should be based on costs over a period of time, and not spot prices. Additionally, production issues should be included in the trigger, such as water use in growing corn (or other crops) for the biofuels, such that the production of the biofuels does not increase GHG emissions or cause other resource problems.

TLU-7. Procure Efficient Fleets

The CAPAG recommends that the State reduce GHGs by increasing the efficiency of vehicle fleets generally, beginning with government lead by example. Also increase fleet use of alternative fuels.

- Increase government fleet use of low-GHG fuels and more efficient vehicles to reduce greenhouse gas emissions from fleets. In addition to CO_2 reductions, this would reduce emissions affecting ozone, sulfur, and carbon monoxide loadings.
- Set statewide GHG reduction targets for fleets phased in over period of probably 8-10 years to allow fleet turnover to absorb most of the costs of replacing existing fleets. Other measures regarding more frequent maintenance and part specifications could be phased in much faster.

TLU-8. Idle Reduction/Elimination Policies

The CAPAG recommends that the State implement state policies, and support the development of local policies, to reduce hours of operation and thus emissions from idling trucks and buses (principally), perhaps off-road engines as well.

These would reduce greenhouse gas emissions from heavy vehicles and reinforce Truck Stop Electrification (TSE).

This would require working with trucking groups, truck stops, and places where trucks stop as well as with government to formulate an agreeable policy approach, phasing schedule, and legislative content.

About 15 states and a number of local governments have adopted anti- idling legislation.[12] More are sure to follow or are already being discussed at some level. Toronto has had a law in place since 1996. Many North Carolina counties and the State Board of Education (Policy No. EEO-M-003) have adopted school bus idling policies already.[13] The Clean School Bus USA program (USEPA) should also be consulted.[14]

TLU-9. Diesel Retrofits/Retirement

The CAPAG recommends that the State reduce diesel emissions from older diesel engine/emission systems through a broad retrofit and/or retirement program. Create incentives and encourage retrofits through a combination of funding and education/promotion.

[12] See http://atri-online.org/research/idling/Cab%20Card%20July%202006.pdf

[13] See http://www.ncbussafety.org/idling.html

[14] See http://www.epa.gov/cleanschoolbus/

This policy would reduce children's exposure to diesel emissions by retrofitting school buses in North Carolina with diesel oxidation catalyst (DOC) control devices, and/or diesel particulate filters, which have the auxiliary benefit of reducing some GHGs and carbon black.

Beyond school buses, the CAPAG recommends that the state speed retirement and/or retrofit of all older diesels through information and incentives.

- **Utilize various funding mechanisms** to purchase DOC pollution control devices and/or particulate traps for school buses that are not equipped with pollution control devices.
- **Provide information and education:** An information and education component is needed to provide truck and bus owners, school districts, and municipal organizations with information regarding the significant emissions reductions that could be achieved by retrofitting or retiring certain truck or bus engines with high annual emissions and replacing them with vehicles meeting the new emissions standards. Provide information on potential funding partners, grants, or loans available from a number of organizations for this purpose.
- **Develop funding mechanisms or incentives:** Develop a loan or grant program allowing truck owners to accelerate new vehicle purchases or to apply retrofit technologies to their fleets.

Currently in North Carolina, there is an ongoing effort to retrofit school buses across the State with diesel pollution control devices. An estimated 15% of the school buses in the State are already equipped with some type of pollution control device. Sources of funding include Federal and State grants, local funding and gifts from private industry. The primary purpose of these diesel pollution control devices is to reduce particulate matter.

Legislation currently under consideration, HB 1912: School Bus Retrofits in Nonattainment Areas, addresses school bus retrofits.

TLU-11. Pay-As-You-Drive Insurance

The CAPAG recommends that the State use Pay-As-You-Drive (PAYD) insurance pricing to convert a portion of insurance to a variable cost with respect to vehicle travel, so premiums are directly related to mileage. PAYD makes insurance more actuarially accurate and allows motorists to save money when they reduce their mileage. The less you drive the more you save.

Proposal would require insurance companies to offer PAYD as part of their menu of insurance choices in North Carolina. A pilot project could be implemented first on a small scale as soon as possible. Option design is to have full North Carolina light-duty fleet PAYD coverage by 2020.

TLU-12. Advanced Technology Incentives

Technology will play a vital role in dramatically reducing carbon emissions from the cars of the future. Fuel cells, plug-in hybrid, low weight carbon-fiber bodies, and other technologies will require research, development, and commercialization. The CAPAG recommends that because of its strong research university and both its high-tech and auto parts manufacturing, that North

Carolina (especially through the Department of Commerce) encourage advanced automobile technology research and recruit the new generation of manufacturers.

Studies can evaluate if there is an economic opportunity around the development and commercialization of advanced technology vehicles and suggest possible models for the Department of Commerce to take advantage of such opportunities.

The following are goals of this policy:

- Enable North Carolina's economy to establish itself in the research, development, and commercialization of advanced automotive technologies.
- Grow North Carolina's capacity to recruit sustainable industry.

TLU-13. Buses – Clean Fuels

The CAPAG recommends that TLU-7 (Procure Efficient Fleets) also include transit bus fleets.