



Transportation and Land Use Technical Work Group

Summary List of Recommended Priority Policy Options for Analysis

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-1	Adopt California Clean Car Standards	0.21	1.14	7.04	NQ	NQ	Pending
TLU-2	Transportation System Management	0.01	0.02	0.14	<0	<0	Pending
TLU-3	Tax Credits for Efficient Vehicles	NQ	NQ	NQ	NQ	7-68	Pending
TLU-4	Improve Development Patterns	0.35	2.10	12.47	<0	<0	Pending
TLU-5	Transit & Bike-Pedestrian	Quantified as Part of TLU-4					Pending
TLU-6	Alternative Fuel Infrastructure	Quantified as Part of TLU-12					Pending
TLU-7	Diesel Engine Emission Reductions and Fuel Efficiency Improvements	0.03	0.19	0.96	-92	-96	Pending
	Biodiesel	0.05	0.38	1.95	NQ	NQ	
TLU-8	Stricter Enforcement of Speed Limits	0.45	0.53	5.26	NQ	NQ	Pending
TLU-9	Make Full Use of CMAQ funds	Not quantified					Pending
TLU-10	Commuter Choice	0.11	0.43	2.51	-516	-240	Pending
TLU-11	Explore Available Resources for Funding Road Maintenance and Mass Transportation	0.06	0.34	1.82	0	0	Pending
TLU-12	Low-GHG Fuel Standard	0.35	3.57	17.07	NQ	NQ	Pending
TLU-13	Freight Vehicle Technology Improvements	Quantified as part of TLU-7					Pending
TLU-14	Rail	Not quantified					Pending
	Sector Total before Adjusting for Overlaps	1.97	8.7	49.22			
	Sector Total After Adjusting for Overlaps						
	Reductions From Recent Actions						
	Sector Total Plus Recent Actions						

GHG = greenhouse gas; MMtCO₂e = million metric tons of carbon dioxide equivalent; \$/tCO₂e = dollars per metric ton of carbon dioxide equivalent; TBD = to be determined.

* TLU-12 overlaps with AFW-4.

TLU-1. Adopt California Clean Car Standards

Policy Description

Reduce greenhouse gas emissions from new motor vehicles (cars and light trucks) sold in South Carolina by adopting legislation equivalent to the California Clean Car Standards (Assembly Bill 1493 also known as “Pavley” the name of the California lawmaker who sponsored the legislation).

California adopted legislation in 2002 (and regulations in 2004) requiring a reduction in greenhouse gas emissions from new cars and light trucks sold in that state beginning with model year 2009. California plans an eight-year phase in.

The California standards incorporate the four main global warming emissions including carbon dioxide, methane, and nitrous oxide resulting directly from the operation of the vehicle (tailpipe emissions) as well as hydrofluorocarbon emissions resulting from leakage from or operation of the air conditioning system.

Policy Design

Goals: Adopt California’s Clean Car program.

Timing: If adopted, the standards would take effect no earlier than the 2011 model year and be phased in over a specified period of time.

Parties Involved: State, auto dealers

Other:

- Ensure that, to the extent possible, South Carolina dealers be able to trade stock with dealers in neighboring states.
- Encourage neighboring states to adopt as well.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

Since California’s adoption of the Clean Car Standards, 12 additional states have adopted its standards.¹

¹ The 13 states have about one-third of the nation’s registered automobiles (California Air Resources Board Technical Assessment: Comparison of Greenhouse Gas Reductions Under CAFE Standards and ARB Regulations Adopted Pursuant to AB1493, January 2, 2008, available at: http://www.arb.ca.gov/cc/ccms/ab1493_v_cafe_study.pdf. In one view, these states are such a large portion of the auto industry sales, that automotive manufacturers would most likely improve technologies for all vehicles, rather than utilize inefficient two-tier production lines.

EPA is developing GHG standards for motor vehicles in response to a recent Supreme Court ruling.

The Energy Independence and Security Act of 2007² established a 35-mpg corporate average fuel economy (CAFE) standard for cars + light-duty trucks—that is, 35-mpg requirement for the new-vehicle fleet—to be reached by 2020.

The California (AB 1493) standard differs from the new federal CAFE standard in many ways.

Table 1. Comparison of California AB 1493 Standard and federal CAFE Standard

Features of the Standards	California Clean Car	HR 6 “Energy Bill” CAFE
1. Type of standard/what is regulated on new cars	GHG emissions per mile	Miles per gallon
2. Main target dates	2016	2020
3. Ending targets, in mpg equivalents	36 mpg ³	35 mpg

Each of these three differences affects both the likely GHG and other emission reductions in South Carolina and the costs and benefits of those reductions.

Type(s) of GHG Reductions

Carbon dioxide, methane, and nitrous oxide resulting directly from the operation of the vehicle (tailpipe emissions) as well as hydrofluorocarbon emissions resulting from leakage from or operation of the air conditioning system.

Estimated GHG Reductions and Net Costs or Cost Savings

Summary

The new CAFE standard, having been signed by President Bush, now becomes part of the South Carolina baseline. Because the California Clean Car standards reach *higher* mpg-equivalencies *sooner*, they would produce additional GHG emissions reductions on top of the new CAFE standard. Also, because the California Clean Car standards allow more ways to reduce emissions than the CAFE standard provides, all else being equal, the California standards should be able to produce equivalent, cheaper improvements in miles per gallon (mpg).

² See <http://www.whitehouse.gov/infocus/energy/>

³ California Attorney General’s Office, “A Comparison of California GHG Standards and the Senate CAFE Target,” November 9, 2007:

“The automobile industry is asserting, in its litigation against the States, that the model year 2016 standards are equivalent to 43.2 miles per gallon (mpg) for the PC/LDT1 category and 26.7 mpg for the LDT2 category. In California, the PC/LDT1 category has about 58% of the entire fleet. (Other States have roughly that percentage, or have more LDT2s, and so compliance with California’s standards will most assuredly ensure compliance with the California standards adopted by other States.) Thus, even assuming the automobile industry’s assertions (which are based solely on tailpipe emissions of carbon dioxide from traditional gasoline powered vehicles), the California standards when fully phased in are equivalent to a fleet-wide average of approximately 36 mpg.”

Analyzing the new CAFE standard’s impact on the baseline, and thus the additional reductions that could be gained from California Clean Car, is made very difficult by the fact that the Energy Independence and Security Act of 2007 not only sets new MPG targets, but also changes the way those targets will be implemented. The law requires the National Highway Traffic Safety Administration (NHTSA) to develop the details of the new approach. In advance of those details, analyses must make assumptions about how the new CAFE standard would be implemented. Those assumptions are explicit in the analysis below.

GHG Reductions

The figures below represent the impact that the California Clean Car standards would have on South Carolina, in addition to the impact of the new CAFE standard of 35 mpg.

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effective-ness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-1	Adopt California Clean Car Standards	0.21	1.14	7.04	NQ	NQ	Pending

This analysis is based on a document recently released by California Air Resources Board (CARB) (see data sources below) that compares the impacts of the California Clean Car standards and CAFE standards on California and other states. It estimates the amount of GHG emissions that each of the two standards would reduce independently of one another.

The 2007 Energy Bill mandates that fleet-wide average fuel economy reach 35 mpg in model year 2020. It does not establish the implementation schedule and the precise mpg standards for each vehicle class, but directs the Secretary of Transportation to establish these. Since precise standards have not yet been established, CARB estimated that implementation would begin in model year 2011, and that fuel economy for each vehicle class would increase at a steady rate of 3.37% per year. The TLU TWG used this assumption in its analysis.

The California Clean Car standards are stated in terms of GHG emissions (grams per mile). The CAFE standard is stated in terms of MPG. Although the one metric is not directly convertible to the other, CARB’s analysis provides a best-fit translation.

The TLU TWG’s analysis adapts CARB’s analysis to South Carolina and judges CARB’s methodology to be a sound comparison of the two standards for California’s LDV fleet. For South Carolina, we use available data on the national fleet. We are not aware of any detailed data on vehicle population and activity rates for the South Carolina fleet. We also delay the implementation of the California standards by two years relative to California’s schedule, in accordance with the policy design of TLU-1. Beginning implementation with the 2011 model year rather than 2009, South Carolina reaches the final standard in 2018 rather than 2016.

We calculate the impact of simultaneous enforcement of both the California standards and the CAFE standard. One standard may be stricter for passenger cars, while the other is stricter for

larger trucks and sport utility vehicles (SUVs). With simultaneous enforcement, the stricter standard in each vehicle class ultimately determines vehicle emissions.

Step by step, we calculate GHG emissions as follows:

1. Calculate proportions of LDV VMT by vehicle age (activity rates) from MOBILE6 defaults for the national fleet.
2. Apportion forecast VMT in each calendar year to vehicle model years.
3. Calculate average emission rates for the LDV fleet in each model year for three policy scenarios:
 - a. CAFE only,
 - b. California Clean Car Standards only, and
 - c. CAFE + California Clean Car standards.
4. For each calendar year, calculate emissions from vehicles in each model year under the three policy scenarios.
5. For each calendar year, calculate total LDV emissions under the three policy scenarios.

Table 2 compares emission reductions from light-duty vehicles in South Carolina under each of the three scenarios to baseline emissions.

Table 2. Comparison of emission reductions

Emission Reductions (MMtCO ₂ e)	2012	2020	2008–2020
New CAFE standards	0.35	3.83	16.88
California Clean Car Standards	0.23	3.97	18.33
CAFE + California Clean Car	0.56	4.97	23.92

Estimation of Cost/Cost Savings

Before the passage of the new CAFE standard, CARB estimated that the California Clean Car Standard would add an average cost of \$1,064 per vehicle, and that the fuel savings would more than offset those additional costs. CARB further estimated that the fuel savings, by starting immediately, would immediately begin offsetting the higher costs of a leased or financed vehicle.

Also before the passage of the new CAFE standard, an analysis by Sierra Research, Inc., commissioned by the Alliance of Automobile Manufacturers, estimated that the average cost of compliance with the Clean Car Standard would be around \$3,000 per vehicle, and that savings on fuel would offset less than half of that cost for consumers. The Sierra finding was largely a result of its assumption that greater fuel economy would encourage consumers to drive significantly more (the “rebound effect”). The CARB analysis also took this effect into account, but estimated its impact to be smaller.

Sierra also expected more expensive technologies and options to be used, where CARB anticipated simpler, less costly technologies. More than \$2,000 of the cost increase estimated by Sierra resulted from the use of expensive light-weight aluminum body structures typically found in sport luxury cars. Such structures are not feasible for use in typical passenger vehicles. In addition, the California Clean Car Standard prohibits the use of such weight-reduction approaches.⁴

A review of \$/ton estimates prepared for the Pavley-type regulation for CARB, Northeast States for Coordinated Air Use Management, and the TLU TWG produces an estimate of between \$117 saved for each metric ton of CO₂e reduced at the high end, and roughly one-third of that (~\$39 saved for each ton) at the low end. All of the analyses found that there would be net cost savings to consumers from the implementation of the Clean Car Standard.

With the passage of the 2007 Energy Bill, a portion of the estimated costs and benefits will be incurred under the new baseline. If we allocate the use of the simpler, more cost effective technology upgrades to the new CAFÉ baseline, the cost effectiveness of the additional compliance with the California Clean Car Standards is likely to decrease. Isolating the cost of the additional emission reductions from the California Clean Car Standard would require an analysis of auto production cost curves, beyond the scope of this analysis. Such an analysis might find either positive or negative net costs for consumers. As a result of this uncertainty, the cost of this policy option is unquantified.

Data Sources:

Default values for fleet population and activity by vehicle age from EPA's MOBILE6 model.

VMT projections from the South Carolina GHG Inventory and Projections.

California Environmental Protection Agency Air Resources Board fact sheet: "Climate Change Emission Control Regulations," December 10, 2004, available at: http://www.arb.ca.gov/cc/factsheets/cc_newfs.pdf

California Environmental Protection Agency Air Resources Board. "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," August 4, 2005, available at: <http://www.arb.ca.gov/regact/grnhsgas/fsor.pdf>

California Environmental Protection Agency Air Resources Board, "ARB Staff Responses to Comments Raising Significant Environmental Issues Regarding the Proposed Regulations to Control Greenhouse Gas Emissions from Motor Vehicles," August 4, 2005, available at: <http://www.arb.ca.gov/regact/grnhsgas/att3.pdf>

California Environmental Protection Agency Air Resources Board, "Comparison of Greenhouse Gas Reductions Under CAFE Standards and ARB Regulations Adopted Pursuant to AB 1493," January 2, 2008, available at: http://www.arb.ca.gov/cc/ccms/ab1493_v_cafe_study.pdf

⁴ CARB, Regulations To Control Greenhouse Gas Emissions From Motor Vehicles: Final Statement of Reasons, August 4, 2005, available at: <http://www.arb.ca.gov/regact/grnhsgas/fsor.pdf>, page 169.

Energy Independence and Security Act of 2007, HR6, available at: <http://thomas.loc.gov/cgi-bin/query/F?c110:8:./temp/~c110YXjDUV:e24923>

Natural Resources Defense Council, “Comments on the Proposed Adoption of Regulations by the California Air Resources Board (CARB) To Control Greenhouse Gas Emissions From Motor Vehicles,” September 23, 2004, available at: <http://www.nrdc.org/globalWarming/crh0904.pdf>

Daniel Sperling et al., “Analysis of Auto Industry and Consumer Response to Regulations and Technological Change, and Customization of Consumer Response Models in Support of AB 1493 Rulemaking,” Institute of Transportation Studies, University of California, Davis, June 1, 2004, available at: <http://www.its.ucdavis.edu/publications/2004/UCD-ITS-RR-04-17.pdf>

Key Assumptions:

New LDVs in South Carolina will be 50% passenger cars and small trucks and 50% large trucks and SUVs. This assumption is consistent with CARB’s assumption for the **national** fleet.

No implementation schedule has been set for the CAFE standard. We assume that phase-in of the standard begins in 2011, with a steady proportional increase in fuel economy of 3.37% per year for both vehicle classes. This assumption is consistent with CARB’s analysis.

Both the California Clean Car and the CAFE standards would be enforced simultaneously. This assumption differs from CARB’s analysis, which compared the separate enforcement of the two standards.

Fleet turnover rates and average activity rates for the national fleet are representative of South Carolina’s fleet of LDVs.

Key Uncertainties

Predicting how long it will take to resolve lawsuits over this issue is beyond the ability of this group. Clearly the law will be in litigation for some time.

NHTSA’s design and implementation of regulations under the new CAFE standard is unknown.

According to auto manufacturers, vehicles for the 2011 model year are already being designed. New engine lines take 6–7 years to develop. Because of the timelines and requirements in the California GHG standards that occur in the 2010–2013 timeframe, the auto industry says that the only way to meet the standards in the early years would be to drop models.

The current highest court rulings on these claims found that in the courts’ views, sufficient existing technology exists to allow manufacturers to meet the California standards.^{5,6}

⁵ See <http://www.vtd.uscourts.gov/Supporting%20Files/Cases/05cv302.pdf>

⁶ The December 11 decision in U.S. District Court for the Eastern District of California can be found at: http://ag.ca.gov/cms_attachments/press/pdfs/n1509_656_order_12-12-07.pdf

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-2. Transportation System Management

Policy Description

Transportation system management (TSM) improves vehicle flow on the roadway system, which can reduce fuel use and GHG emissions. Coordinated operation of the regional transportation network can improve system efficiency, reliability, and safety. Tools to reduce traffic congestion include HOV lanes, improving mass transit services, roundabouts at intersections, synchronized signals, incident management, variable message signs, varying work schedules, and other forms of intelligent transportation systems (ITS).

Coordinating a variety of tools within a congested corridor can maximize benefits to motorists and transit users. For example, low-cost bus lanes can be implemented by converting the shoulders of a congested urban freeway to allow peak-hour bus use. An incident management system—SCDOT provides a Motorist Assistance Patrol (MAP) in several interstate corridors currently—would respond to disabled vehicles and remove them quickly from the bus lanes. Computer-controlled coordinated signal systems on the arterial routes reduce delay for motorists and offer the option for buses to preempt traffic signals to improve reliability and reduce transit travel times.

Policy Design

Goals: Use infrastructure management to reduce emissions by 10% by 2025 relative to the baseline in the most congested corridors in each of South Carolina’s three largest metro areas.

Goal would be achieved by implementing pilot TSM projects in the most congested corridors in each of South Carolina’s three largest metro areas—Charleston, Columbia, and Greenville. The pilot projects should include

- Installation of necessary fiber optic cable and computerized traffic control systems to coordinate signal timing in the corridor,
- Transit service improvements including limited stop or express bus service with traffic signal preemption equipment, and
- At least one other TSM strategy that would be effective in the corridor.

Timing: Begin implementation ASAP.

Parties Involved: SCDOT Office of Planning, SCDOT Traffic Engineering, MPO planners, and transit officials.

Other: [As needed]

Implementation Mechanisms

Additional funding is needed to provide SCDOT engineering staff to effectively manage an expanded computerized traffic signal system; like all “expert systems” this technology does require ongoing maintenance and attention to work effectively.

Related Policies/Programs in Place

Coordinated signal systems in Wade Hampton Blvd. (US 29) and Woodruff Road (SC 146) corridors in Greenville.

SCDOT Motorist Assistance Patrol.

Variable Message signs in some Interstate corridors.

Smartride—limited stop commuter bus service between Columbia and the Lugoff/Camden and Newberry areas.

CARTA Express—limited stop commute alternative that connects area residents into downtown Charleston.

York County—82x Express Bus service to Charlotte. Started in 2001, 214 daily riders.

Proposals to implement limited stop commuter service in the I-385 corridor serving Mauldin and Simpsonville

This policy would support:

- TLU-4 – Improve Development Patterns
- TLU-5 – Transit and Bike-Pedestrian
- TLU-10 – Commuter Choice Programs

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-2	Transportation System Management	0.01	0.02	0.14	<0	<0	Pending

Data Sources:

Network traffic projections for the Greenville, Columbia, and Charleston urban areas provided by SCDOT and MPOs.

Traffic counts and projections on designated congested corridors in the Greenville urban area provided by the Greenville MPO.

Annual VMT by vehicle and facility type from FHWA, Highway Statistics 2005 (VM-1).

Quantification Methods:

The Greenville MPO identified its most congested corridors as candidates for TSM measures. CCS then estimated annual VMT on these corridors using available traffic counts and projections. VMT for each segment is estimated as the length of the segment times the mean of traffic counts from each available count site on the segment. Total VMT on these corridors accounts for about 8% of the Greenville area network total. We assume that the Columbia and Charleston areas have a similar concentration of traffic on congested corridors eligible for TSM measures. Accordingly we estimate traffic on candidate corridors in these areas as about 8% of total network VMT. **While more detailed modeling could refine this estimate, that modeling is beyond the scope of this analysis, and the level of uncertainty associated with identifying corridors and estimating baseline emissions does not warrant additional modeling at this time.**

We distribute VMT between light- and heavy-duty vehicles based on national averages for urban roads (FHWA, Highway Statistics). Baseline GHG emissions are estimated using average grams of GHGs emitted per VMT from the state GHG inventory.

Emissions from congested conditions (due to vehicle idling, rapid acceleration and deceleration, and sub-optimal travel speeds) are most likely to occur in South Carolina cities during peak travel periods. During the off-peak period, TSM measures to smooth traffic flow are less likely to have an impact on GHG emissions. We therefore apply emissions reductions to peak-period emissions only. We estimate peak period travel as 50% of total travel on the designated corridors (Source: Texas Transportation Institute, Urban Mobility Report, Exhibit A-1).

The stated goal of the policy is to reduce baseline emissions by 10% by the year 2025. Given the time needed to plan, fund, and implement TSM measures, we assume that emissions reductions begin in year 2010. Increasing steadily, emissions reductions reach 7% in 2020. We multiply this percentage by the baseline GHG emissions to derive tons of emissions reduced.

This method produces a conservative estimate of emission reductions because the baseline figure underestimates GHG emissions on these corridors. A disproportionate amount of vehicle idling occurs on these corridors as cars and trucks wait at crowded intersections and negotiate traffic accidents. Additional fuel burned by vehicles idling and traveling at sub-optimal speeds represents additional GHG emissions on these corridors. These emissions are not captured by the grams per VMT factor applied. Existing emissions models do not allow us to estimate these additional emissions with any degree of certainty.

Costs and Benefits

The costs and benefits of the policy remain unquantified. Actual costs and benefits will depend on the types of programs and systems chosen to meet the goal. Experience with these programs elsewhere has shown high cost-effectiveness, reducing delay and emissions.

Transportation system management (TSM) improves vehicle flow on the roadway system, which can reduce fuel use and GHG emissions. One way to meet the Transportation-related GHG goal would be to implement pilot TSM projects in the most congested corridors in each of South Carolina's three largest metro areas. The policies chosen include:

1. Installation of necessary fiber optic cable and computerized traffic control systems to coordinate signal timing in the corridor,
2. Transit service improvements including limited stop or express bus service with traffic signal preemption equipment, and
3. At least one other TSM strategy that would be effective in the corridor.

The meta-analysis for the agreed-upon TSM options will be limited to policies 1 and 2.

Coordinated Signal Timing

Several different examples can help to estimate the level of benefits the South Carolinian communities can expect, including Boston, MA, Toronto, Canada, and the State of California.

The City of Boston's comprehensive study of its historic Back Bay and its transportation remains one of the most detailed signal timing studies. In the late 1980's, The City was unsure how to deal with both a densely populated residential and employment center, as Back Bay was and still is. Part of the City's plan was based on signal timing improvements. By improving the arterials, more traffic flowed faster and reduced delay. The travel time reduction was over 30%. Travel time counts indicated that the arterials were carrying 30-40 more traffic during peak hours, shifting from local roads. Computer analysis further indicated that while the plan would not reduce overall VMTs, it would reduce daily vehicle hours of travel by an estimated 5%.⁷

Furthermore, based on this experience and the City of Sacramento, EPA note the costs scenarios for a similar timing plan. Costs vary greatly depending on the type of improvements and the number of signals. They estimated that the timing optimization program for Downtown Sacramento involved over 200 locations and cost about \$100,000. For the City of Boston, a new computerized traffic signal control system involving 300 intersections in downtown Boston and including several new timing strategies, interconnection, and controller timing is estimated to cost about \$4,000,000.⁸

Toronto, Canada offers more recent examples. In Toronto, 3 signal networks were implemented encompassing 75 signalized intersections. An on-street evaluation conducted

⁷ Summarized from EPA TCM Information Document, "Traffic Flow Improvements," http://www.epa.gov/otaq/stateresources/policy/transp/tcms/traff_improv.pdf

⁸ Summarized from EPA TCM Information Document, "Traffic Flow Improvements," http://www.epa.gov/otaq/stateresources/policy/transp/tcms/traff_improv.pdf

from May-June 1993 found an 8 percent average decrease in travel time, a 22 percent average decrease in vehicle stops, a 17 percent average decrease in vehicle delay, a 5.7 percent average decrease in fuel consumption, a 3.7 percent average decrease in hydrocarbons, and a 5.0 percent average decrease in Carbon monoxide emissions.⁹

Most informative, California studied the benefits of signal timing plans, coordinated traffic signals, and adaptive signal control at locations statewide. Between 1983 and 1993, the program included local agencies and 334 projects, improving 12,245 signals at a cost of \$16.1 million, or \$1,091 per signal. The TRANSYT-7F model estimates from 163 of the 334 FETSIM projects (49 percent), representing 55 percent of the total number of signals retimed, demonstrated positive results from signal retiming of coordinated signal systems. The study found an average 7.7 percent reduction in travel time, 13.8 percent reduction in delays, 12.5 percent reduction in stops and 7.8 percent decline in fuel use. The variation in improvements depended on the quality of existing timing plans, the network configuration, traffic patterns, and signal equipment. Regardless, the benefit to cost ratio for these actions was 17:1.¹⁰

Express/Limited Stop Bus with Signal Preemption

Just as signal timing can offer benefits, so can express/limited stop buses with signal preemptions, similar to those in Chicago, IL, Portland, OR, and Arizona.

Recently, traffic congestion in the Chicagoland area has become so severe that that bus service is slowed significantly. Pace, the metro area's public bus service, determined that timeliness was more important to its customers than expanded coverage. In response, some Pace have signal preemption capacity. Preliminary studies show a 33-percent decrease in travel times without congesting cross streets. Other transit systems have found this technology reduces bus travel times by 5 percent to 10 percent, depending on the number intersections and the amount of traffic load.¹¹

Within the city limits, a feasibility study concluded that it was cost-effective to invest in a Cooperative Vehicle-Highway Automation System (CVHAS) to improve the performance of bus rapid transit (BRT) operations and freight movement in Chicago, Illinois, which included signal preemption. The findings concluded that each application could break even; the deployment of precision docking technology and transit signal priority would be cost-effective as long as they provided relatively small improvements in bus travel times (one to four seconds per stop, and seven seconds over a 15 to 20 minute bus run;

⁹ Available at:

<http://www.itsbenefits.its.dot.gov/its/benecost.nsf/5c36f979ce2c926a852569bc006c5713/acfc2902273c2ccb852569610051e299?OpenDocument>

¹⁰ Available at:

<http://www.itsbenefits.its.dot.gov/its/benecost.nsf/ID/42419C3E5993E9CD852569EA0071D556?OpenDocument&Query=BApp>

¹¹ National Governor's Association. State Innovations to Reduce Vehicle Emissions. Available at:

<http://www.nga.org/Files/pdf/EMISSIONSREPORT.pdf> 19-20.

respectively). Furthermore, there were consistently large to very large benefit-to-cost ratios.¹²

Many case studies discuss the possibility of benefits for these projects. For other drivers, models in Tucson, AZ and Seattle, WA indicate these changes can decrease the delays travelers on main streets by 18.5 percent while decreasing delay for travelers on cross-streets by 28.4 percent.¹³ By contrast, in Portland, OR, TriMet reversed course. When the signal priority was not used, bus times increased from 1.5-4.2%.¹⁴

Combined, these TSM strategies are cost-effective from the social perspective with a proven track record of success. Most persuasively, these strategies offer emissions benefits as well as improvements in travel time and other delays, maximizing the use of the current transportation system. California demonstrated how the benefits outweighed the costs 17 to 1. The two Chicagoland studies illustrate how signal preemptions are cost-effective as well. Both strategies can effectively help reduce GHG emissions now in South Carolina's largest cities.

Key Assumptions:

The majority of GHG emissions on the designated corridors are attributed to VMT, not to congested conditions.

The three urban areas have roughly the same concentration of traffic on their most congested corridors.

50% of traffic occurs during the peak period.

Key Uncertainties

The amount of GHG emissions specifically from congested conditions, including stop-and-go conditions and vehicle idling, is unknown.

Additional Benefits and Costs

By reducing congestion, this policy would also improve mobility on key corridors in South Carolina's urban areas. There is also a potential additional cost from induced travel. If

¹² Available at:
<http://www.itsbenefits.its.dot.gov/its/benecost.nsf/ID/E4EE23B6F59B0C168525733A006D5983?OpenDocument&Query=BApp>

¹³ Available at:
<http://www.itsbenefits.its.dot.gov/its/benecost.nsf/ID/11AA42D96687F6C785256A9B004FB057?OpenDocument&Query=BApp>

¹⁴ Available at:
<http://www.itsbenefits.its.dot.gov/its/benecost.nsf/ID/545B3597D5614D9085256DDC006D8EF9?OpenDocument&Query=BApp>

smoother traffic conditions attract more vehicles to the designated corridors, there may be fewer or no net benefits from the policy.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-3. Tax Credits for Efficient Vehicles

Policy Description

The State of South Carolina has already made significant progress in the area of tax incentives for alternative and energy efficient vehicles. A maximum of \$300 sales tax rebate will be available beginning July 1, 2008 for in-state purchases of new, used, or leased low-GHG vehicles including pure electric, hybrid, plug-in hybrid, flex-fuel, lean-burn, hydrogen, and vehicles with a city fuel-economy rating by the United States Environmental Protection Agency (EPA) of thirty miles a gallon or higher (Act No. 83, 2007). Up to a \$500 sales tax rebate will be offered for EPA-certified equipment that converts a conventional vehicle to an alternative fueled vehicle that will operate on propane, compressed natural gas, liquefied natural gas, hydrogen, or E85 (Act No. 83, 2007). The sales tax rebates will be phased out on July 1, 2013. A \$2,000 income tax credit will also be available beginning January 1, 2008 for in-state purchases of plug-in hybrid vehicles (Act No. 83, 2007). The income tax credits for plug-in hybrids will be phased out on January 1, 2011. In 2006 the state began offering an income tax credit for alternative fueled and hybrid vehicles equal to 20% of the federal credit (Act No. 312, 2006). There is no phase-out period for this state income tax credit.

Unfortunately, despite the good intentions of the legislation, there are some necessary improvements. The sales tax rebates in Act No. 83, 2007 are capped collectively at \$4,150,000. In the short term this may not present a problem, but as these vehicles become more common it will be difficult to determine which buyers will be able to claim the sales tax rebate. The same concept applies to the state income tax credit for plug-in hybrid vehicles which is capped at \$200,000. Additionally the language in Section 12-63-20 (A)(1)(e)(3) regarding the 20% phase-in each year of the program is restrictive and confusing.

Other state incentives that were considered included reduced or free registration fees for low-GHG vehicles. The committee decided that a reduced or free registration fee would not be an additional incentive due to the low-cost of state fees, and the program would be difficult and costly to administer.

The committee also evaluated the option of a feebate for all vehicles. The concept of a feebate is to tax high-GHG emission vehicles and offer tax incentives for low-GHG emission vehicles. The committee felt strongly that this option would present an undue burden to state residents and would be difficult and costly to administer the program.

Policy Design

Goals: Maintain and enhance the current state tax rebates and state income tax credits for low-GHG emission vehicles. Among the improvements needed in state legislation are presented in Act No. 83, 2007 include:

- SC Code 12-63-20(1)(a)—\$300 rebate for E-85 flex-fuel vehicles; remove \$2,050,000 cap.

- SC Code 12-63-20(1)(b-e)—\$300 rebate for hybrids, plug-in hybrids, electric, hydrogen-fueled, lean-burn, and high-fuel-economy vehicles as well as equipment to convert conventional vehicles to operate on alternative fuels; remove \$2,100,000 cap.
- Section 12-63-20 (A)(1)(e)(3)—remove legislation regarding the phase-in of the rebate program.
- SC Code 12-6-3376—\$2,000 tax credit for plug-in hybrid vehicles; remove \$200,000 cap.

Timing: These improvements to legislation should be made by the end of the 2008 legislative session since beginning July 1, 2008 the majority of the state incentives for low-GHG emission vehicles will go into effect.

Parties Involved: South Carolina General Assembly, South Carolina Biomass Council, South Carolina automobile dealers, alternative vehicle advocates, and private vehicle owners

Implementation Mechanisms

Amendments as defined above in the Goals section to Act No. 83, 2007.

Related Policies/Programs in Place

2006–2007—In FY07 Budget Appropriations, the South Carolina General Assembly established \$300 sales tax rebates for flex-fuel, hydrogen fuel cell, and plug-in hybrid vehicles. The appropriation also established up to a \$500 sales tax rebate for hybrid to plug-in hybrid conversion equipment.

2006–2007—Act. No. 312: The South Carolina General Assembly established the state income tax credit for alternative fuel and hybrid vehicles that mimicked the federal tax credits established in the Energy Policy Act of 2005. The state income tax credit is worth 20% of the federal income tax credit.

2008–2012—Act. No. 83: The South Carolina General Assembly passed a series of sales tax and income tax credits that expanded upon the FY07 Budget Appropriation as outlined above.

Type(s) of GHG Reductions

Primarily CO₂.

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Deleted: TBD – [CCS to list GHG reductions with input / approval from TWG]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-3	Tax Credits for Efficient Vehicles	NQ	NQ	NQ	NQ	7-68	Pending

Data Sources:

Average Vehicle Lifetime Mileage from DOE and EPA:
www.fueleconomy.gov/feg/tech_engine_more.shtml

Emission Reductions Estimates using the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model, version 1.7.

Quantification Methods:

The emissions impact of this policy depends on consumers’ responses to the tax credits. Consumers response to the existing SC tax credit has been small. There is no evidence on why consumer response to these tax credits in SC has not been larger: lack of awareness? Incentive too small? Vehicles not available? Unless we know that we are addressing the root of the small response, we cannot know if a higher incentive will produce a larger response.

We *can* estimate the direct cost to the state of this policy per ton of emissions reduced. Each tax credit granted represents an emission reduction from the vehicle purchased. The table below calculates the cost effectiveness of the rebates for several key vehicle technologies. We exclude vehicle technologies specified in the policy that are either poorly defined or not likely to be commercially available in the near future.

Vehicle Type	Sales Tax Rebate (\$)	Income Tax Rebate (\$)	Total Cost to State (\$)	GHG Reduction* (grams/mile)	Lifetime Vehicle Mileage	Lifetime GHG Reduction (metric tons)	C.E. (\$/ton)
Hybrid Plug-in Hybrid	300		300	169	185,000	31.3	10
Hybrid	300	2,000	2,300	183	185,000	33.9	68
Electric	300		300	247	185,000	45.7	7

* compared to conventional gasoline vehicle

We also exclude E-85 flex fuel vehicles from the calculations. Since flex fuel vehicles can run exclusively on conventional gasoline, there is no guarantee of reductions from their sale. A 2002 study by the USDOT found that E-85 constituted only about 1% of the fuel consumed by flex fuel vehicles between 1996 and 2000.¹⁵

Indirect costs or cost savings to consumers or manufacturers from the sale of clean technology vehicles are excluded.

Key Assumptions:[TBD, as needed on TWG approval]

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Key Uncertainties

TBD – [as needed and approved by the TWGs]

¹⁵ <http://www.dallasnews.com/sharedcontent/dws/bus/stories/010606dnbusfuel.4fa74d14.html>

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-4. Improve Development Patterns

Policy Description

South Carolina is growing rapidly, and where that development locates has substantial impacts on GHG emissions. Growth can be accommodated in a variety of ways that reduce emissions. The overall goal of this policy option is to help South Carolina grow in a way that protects the state's environment, climate, economy, and quality of life. To give two examples:

Infill and brownfield developments produce less vehicle travel and emissions than development on lower density exurban or “greenfield” locations. Households and workers in areas with higher density and mixed uses take shorter trips and use more alternatives to automobile travel. “Brownfields” are one type of infill location—commercial or industrial properties that are abandoned or are not being fully used because of actual or perceived environmental contamination.

Transit oriented development lets people drive less by building compact, mixed-use development clustered around transit stops.

Policy Design

Goals:

The goal of this policy is to stabilize per capita VMT at today's levels by 2010 (“2010 VMT”), by requiring local governments to stabilize VMT within their jurisdictions to 2010 VMT.

Each local government would be free to implement land use tools that it determines are best suited for stabilizing 2010 VMT within their respective jurisdictions. Such land use tools would be designed to promote more efficient development patterns by encouraging and promoting highly connected street networks, higher residential and employment densities and mixed land uses in new and existing development. Coordination with transportation agencies, such as federal metropolitan planning organizations, will be necessary.

State actions to accomplish this policy option include the following:

- **Amend the Comprehensive Planning Act to require all counties in South Carolina to establish planning commissions and to require those commissions to prepare comprehensive plans that stabilize VMT within their jurisdictions to 2010 VMT;**
- **Expand the state incentives for brownfield redevelopment in South Carolina. These incentives could include grants or loans, with preferences given to projects that meet sustainable development principles;**
- **Amend the Comprehensive Planning Act to require planning commissions to assess the impact of their comprehensive plans on greenhouse gas emissions;**

- **Reestablish the Division of Regional Development and provide adequate funding for the Division to meet its responsibilities under the law;**
- **Implement the related recommendations of the Quality of Life Task Force;**
- **Implement the five recommendations and the strategies that have been outlined in detail for each of the recommendations in the Growing by Choice or Chance report;**
- **Expand the state incentives for conservation such as by improving the tax credits for conservation easements;**
- **Increase the amount of funding for the South Carolina Conservation Bank and the South Carolina Heritage Trust program; and**
- **Provide state incentives and resources to encourage planning and implementation of plans.**

One model for developing and distributing VMT goals is the “conformity” requirements under the US Clean Air Act. Conformity requires that state, and by extension regional and local, transportation plans, “conform” to the goal of reach air quality standards that protect human health. Attaining those standards requires action at three levels:

1. **the federal government (and/or California + states adopting California standards) set vehicle technology standards;**
2. **the state funds and sets design parameters for transportation systems in the state;**
3. **regions and local jurisdictions make the transportation and land use decisions.**

Setting and attaining a VMT goal would follow a similar path at each level. The suggested goal is given in this Option. Further policy development would require answering the following questions:

- **How deal divide/set VMT goals between rural and urban jurisdictions, and/or between areas with different growth rates.**
- **How to enable regional cooperation to facilitate efficient VMT management between areas with different growth rates**

Recommended actions at this point are:

1. **Mandate a study by Planning Commissions together with Councils of Government about how regional VMT management c/would work, with recommendations to be made to the state;**
2. **require that this study emphasize the ancillary benefits of planning and coordination for infrastructure, water, and conformity with new Clean Air Act ozone standards.**

Timing: Begin implementing these immediately

Parties Involved: State, regional, and local planning authorities

Other: [As needed]

Implementation Mechanisms

Implement the recommendations of the Quality of Life Task Force (www.scgovernor.com/NR/rdonlyres/75BF67C5-746E-41AA-8A26-BA73EF0BA851/0/QualityofLifeTaskForceReportFINAL.pdf) which fall under four categories:

1. Community Growth

- Community Schools
 - Eliminate minimum acreage requirements; cap student populations for future facilities.
 - Require coordination among school boards and local governments to plan school sites and avoid conflicts.
 - Favor restoration and construction of community-based small schools over new construction of remote mega schools.
- Efficient Public Investment
 - Require fact-based decision-making: major projects should conform to adopted plans, developed by local authorities, to keep politics from guiding infrastructure decision-making,
 - Public entities should plan where they build and only build where they plan.
 - Local governments coordinate with other local authorities to designate priority investment areas which will receive funding preferences
 - Highway system maintenance should take precedence over new roads
- Affordable Housing
 - Reduce regulations that are inefficient and excessively impact housing affordability, particularly for lower income and minority families.
 - Support private-sector efforts in affordable housing and community development.
- Traditional Neighborhoods
 - Remove legal impediments to traditional neighborhood designs and provide incentives for the construction and revitalization of traditional neighborhoods.
- Public Transportation
 - Integrate transportation planning with land use planning so public transit can make a comprehensive contribution to economic development and mobility.
 - Evaluate public transportation opportunities, including intra-regional and inter-regional systems.
- Protecting Traditional Communities

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- Evaluate rural communities and designate those which have served as ancestral habitation for more than 100 years as historic areas; require that eminent domain processes respect this designation.
- Downtown Revitalization
 - Work with Community Builders, Main Street programs, and other non-governmental organizations to encourage downtown renewal and revitalization projects.

2. Land Conservation

- Conservation Incentives
 - Raise the per acre cap in the Conservation Incentives Act; raise the maximum annual credit.
 - Increase funding for the South Carolina Conservation Bank.
- Heirs' Property
 - Endorse and support existing private initiatives addressing this issue.
- Focus Area Expansion
 - Encourage public/private partnerships in promoting conservation initiatives based on the ACE basin model.
- Traditional Agriculture and Forestry
 - Support farmland protection initiatives.
- Best Development Practices
 - Develop and promote incentive-based standards for use by landowners to implement conservation measures in their land management practices or for new development.
- Natural Resource Education
 - Support curricular efforts to teach students the value of conservation of South Carolina natural resources.

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3. Regulatory Reform

- Provide Incentives for Infill and Re-Development of Greyfield and Brownfield Areas
 - Local and state incentives could include expedited, prioritized processing of approvals; reduced impact fees; and other economic incentives.
- Adopt Property Rights Legislation Consistent with the Qualify of Life Task Force Vision Statement
 - Provide property owners and local governments the opportunity and flexibility to mediate land use regulation disputes.
- Adopt Additional Protection for Isolated Freshwater Wetlands Based on Function and Size
 - New regulations should not be “one-size-fits-all” but graded by function and size.
- Reform Annexation and Condemnation Laws

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4. Resource Inventory/Uniform Vision

- Sponsor a statewide visioning process based on citizens’ input and a bottom-up approach.
- Support coordination of existing resource data for use in all aspects of land use planning.
- Support training and technical assistance to local governments in vision-driven planning.

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Related Policies/Programs in Place

The South Carolina Comprehensive Planning Act gives local governments the authority to establish planning commissions. If established, these commissions have certain powers and responsibilities, including “the function and duty . . . to undertake a continuing planning program for the physical, social, economic growth, development, and redevelopment of the area within [their] jurisdictions.” In addition, these commissions must prepare comprehensive land use plans that address the following elements: (1) population, (2) economic development, (3) natural resources, (4) cultural resources, (5) community facilities, (6) housing, (7) land use, (8) transportation, and (9) priority investment. The planning commissions must review their plans at least every 5 years and update them at least every 10 years. The commissions have “the power and duty” to recommend to the local governing authority measures for implementing the plan, such as zoning ordinances, subdivision regulations, landscaping ordinances, and capital improvement programs. The local governing authority may, after receiving a favorable recommendation from the planning commission and holding a public hearing, adopt the land use plan in whole or in part or reject it.

The South Carolina Comprehensive Infrastructure Development Act, passed in 1997, created a new division within the South Carolina Budget and Control Board called the Division of Regional Development (DRD) and gave it responsibility “for the creation of a state infrastructure development plan, for the coordination of regional infrastructure development plans, and for the coordination of state programs and resources that impact or affect infrastructure development.” The law directs the 10 Regional Councils of Government (COGs) to develop regional infrastructure plans in cooperation with the DRD, and the DRD must consider those plans in creating the statewide infrastructure plan. The South Carolina General Assembly never provided any funding for the DRD, and the Budget and Control Board has dissolved it. The law, however, is still on the books.

In his first State of the State address in January 2003, Governor Mark Sanford declared that maintaining and improving the State’s quality of life was one of the top priorities of his administration. This was soon followed by the report from the Governor’s “Quality of Life Task Force,” which contains more than 30 “smart growth” recommendations.

Another important effort is the “South Carolina Quality Growth Initiative,” launched in 2001 by the Urban Land Institute and the South Carolina Real Estate Center at the University of South Carolina. The sponsors assembled a broad based steering committee of 36 people, composed of developers, public officials, scholars, business leaders, environmental advocates, and concerned citizens from across the state, to guide and oversee the initiative. A statewide symposium and four regional forums were held to hear from the public on growth and development issues. In 2004, the steering committee issued its final report, *Growing by Choice or Chance: State*

Strategies for Quality Growth in South Carolina, which sets forth 10 basic principles of quality growth and 5 recommended actions at the state level (http://www.uli.org/AM/Template.cfm?Section=Search§ion=Special_Reports&template=/CM/ContentDisplay.cfm&ContentFileID=376).

Finally, conservation and open space protection includes programs designed to protect and conserve important lands and natural resources in the State and to provide active and passive parks for public use and enjoyment. This option could also include policies to discourage the expansion of urban growth areas or urban growth boundaries. Policies that increase the value of rural lands for agricultural or forestry uses to serve local markets can promote these objectives.

The principal sources of funding for conservation at the state level are the South Carolina Conservation Bank and the Heritage Trust program. Both programs are funded by a portion of the deed recording fees, which are collected when real estate is sold in the State. A few counties in the State currently provide significant funding for conservation and open space protection.

Brownfield Redevelopment

Current state law encourages brownfield redevelopment by offering liability protection contracts for non-responsible purchasers of contaminated property (S.C. Code § 44-56-71- et seq.) and by providing state income tax credits (§ 12-6-355), job tax credits (§ 12-6-3360(e)(2)), reduced investment minimum for fee in lieu of property taxes (§ 4-12-30(B)(3)), and 5-year property tax exemption at the option of local government (§12-37-220(44))

Priority Investment Act (PIA)

S266 became law on May 23, 2007. The Act amends the Local Government Comprehensive Planning Enabling Act of 1994 to improve the local government comprehensive planning process and to provide local governments new zoning tools.

The PIA adds two new elements to the comprehensive planning process. The Act provides for a specific transportation element requiring local governments to consider all transportation facilities (including roads, transit projects, pedestrian and bicycle projects) as part of a comprehensive transportation network. The Act also adds a new priority investment element, which requires local governments to analyze available public funding for public infrastructure and facilities over the next ten years and to recommend projects for expenditures of those funds for needed public infrastructure. This element will require more prioritized planning for public infrastructure and facilities such as water, sewer, roads, and schools. Additionally, the priority investment element requires a basic level of coordination between local governments. The Act requires that the priority investment element be developed through coordination with “adjacent and relevant jurisdictions and agencies.” All governmental entities and utilities—counties, municipalities, public service districts, school districts, public and private utilities, transportation agencies, and other public entities—that are affected by or have any planning authority over the public project identified in the priority investment element must be consulted in the coordination process. The Act provides for a basic level of coordination requiring written notification to the other agencies and an opportunity for comment on the proposed projects.

The PIA also provides for two new zoning tools to promote affordable housing and traditional neighborhood design. The Act requires that local governments carefully analyze regulatory

requirements affecting the affordability of housing and to identify those nonessential housing regulatory requirements that are not necessary to protect the public health, safety or welfare and. Local governments must also analyze market-based incentives that may be made available to encourage the development of affordable housing. The Act allows local governments to identify priority investment zones in which local governments may adopt market based incentives or relax or eliminate nonessential housing regulatory requirements in order to encourage affordable housing. Additionally, the Act allows local governments to identify priority investment zones to encourage traditional neighborhood design—communities with mixed residential and commercial uses that look and function like traditional towns and neighborhoods. The Act defines market based incentives to include density bonuses, relaxed zoning regulations such as lot area requirements or setbacks, reduced or waived fees, fast track permitting and design flexibility. Nonessential housing regulatory requirements may include requirements like minimum lot size, setbacks, open space requirements, landscaping, impervious surfaces and parking requirements.

Open Space Protection

Existing state law funding and promoting open space protection includes the Conservation Bank Act (§48-59-10), the Heritage Trust Program of the Department of Natural Resources (§ 57-17-10) and the Conservation Easement Act (§27-8-20).

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
LU-4	Improve Development Patterns	0.35	2.10	12.47	<0	<0	Pending

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Data Sources:

VMT from the South Carolina GHG Inventory and Projections

Population projections from SCDOT

Quantification Methods:

We calculate light-duty VMT per capita for each year from 2008 to 2020. Per capita VMT increases steadily from 10,900 in 2008 to 12,200 in 2020 in the baseline projections. According to the stated goal, we calculate the reduction in GHG emissions with no growth in per capita VMT after 2010.

For cost information, a variety of literature finds that integrated transportation and land use planning produces substantial net savings on the total costs of buildings + land + infrastructure + transportation. Some components may be higher even though total costs are reduced. The preponderance of literature suggests net savings overall (see U.S. Environmental Protection Agency, *Our Built and Natural Environments: A Technical Review of the Interactions Between Land Use, Transportation, and Environmental Quality*, 2001). A National Academy of Sciences/Transportation Research Board review found substantial regional and state-level infrastructure cost savings from more compact development (see Robert Burchell, et al., *The Costs of Sprawl—Revisited* (TCRP Report 39), Transportation Research Board, Washington, DC, 1998). An analysis of the New Jersey State Plan found that municipalities, counties, and school districts would save an estimated \$160 million from 2000 to 2020 by pursuing smart growth patterns (see Robert Burchell, et al., *The Costs and Benefits of Alternative Growth Patterns: The Impact Assessment of the New Jersey State Plan*, Center for Urban Policy Research, Rutgers University, 2000).

Key Assumptions: This goal applies to light-duty VMT only.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-5. Transit & Bike-Pedestrian

Policy Description

Enable personal trip-making to move from single-occupant motor vehicles to lower-GHG-emitting transportation options such as walking, bicycling, ride-sharing and mass transit* and ensure that the state's transportation system is fully integrated with and appropriately serves the development patterns called for under TLU-4.

[Note: As used throughout this policy option, the term "mass transit" encompasses both public and specialized transit services operating both within and between rural and urban areas. The term also includes intercity bus, conventional passenger rail service such as Amtrak and commuter rail, High Speed Rail, and other forms of fixed guide-way transit such as light rail.]

Policy Design

Goals: Enable personal trip-making to move from single-occupant motor vehicles to lower-GHG-emitting transportation options such as walking, bicycling, ridesharing and mass transit by achieving the following goals:

- Increase personal mobility options and opportunities by expanding and improving bicycle and pedestrian networks and related facilities both as feeders and as stand-alone modes of travel in all areas of the state.
- Increase personal mobility options and opportunities by promoting and creating ride-share programs within both the public and private sectors.
- Increase personal mobility options and opportunities by improving and expanding the state's existing network of mass transit systems and services.
- Increase personal mobility options and opportunities by implementing "complete streets" policies to ensure that all new roadways and streets accommodate all modes of personal transportation where practical and feasible.

Implementation of the above set of policies will stabilize per capita VMT at today's levels by 2010.

Timing: The timing for achieving the above listed goals will vary as detailed below.

- Many of the state transportation programs required to achieve the above listed goals are in place and are being implemented to some degree or another.
- Although, many of the state transportation programs required to achieve the above listed goals are in place, additional fiscal resources may be needed to implement them fully. This can only be accomplished through the state transportation budgeting and programming processes, as well as identifying new sources of revenue
- New state transportation programs will need to be created to fully achieve the above listed goals. The creation of these programs will occur through the state legislative process.

- The need for improving and expanding the state's existing network of mass transit systems and services will typically be generated through existing and new transportation planning processes at the state, regional, and local levels.

Parties Involved: Governor's Office and Cabinet Agencies, South Carolina Legislature, SCDHEC (various offices: Air Quality [to document improvements], Division of Obesity Prevention and Control [for advising on the health component to more physically active transportation]), Palmetto Cycling Coalition, South Carolina Coalition for Promoting Physical Activity, metropolitan planning organizations, Councils of Governments, municipalities, counties, mass transit agencies and providers, private sector employers, railroads.

Other:

Federal transportation agencies such as the Federal Highway Administration, the Federal Transit Administration, and the Federal Railroad Administration.

Implementation Mechanisms

Implement the *State Multi-Modal Transportation Plan* that is scheduled to be adopted by the SCDOT in early 2008.

Create a new state mass transit aid program to fund 50% of the annual operating costs of mass transit systems in South Carolina to be administered by the SCDOT. The SCDOT shall audit the financial records of each aid recipient on an annual basis and shall audit the performance (efficiency and effectiveness) of each aid recipient on a 5-year cycle.

Create a new state mass transit aid program to fund 90% of the costs of mass transit projects designed to test and evaluate the costs and benefits of innovative ways for the state's mass transit systems to provide mobility. The deployment of innovative technologies shall be encouraged. The program would be administered by the SCDOT.

Create a new state mass transit aid program to fund 50% of the non-federal share of capital improvement projects of the state's mass transit system to be administered by the SCDOT. All facility renovation or new facility construction projects funded under this program shall be designed to meet appropriate Leadership in Energy and Environmental Design (LEED) standards promulgated by the U.S. Green Building Council.

Create a new state program to aid communities in the retrofitting of pedestrian and bicycle infrastructure that was frequently omitted over a 50+ year period from the mid 1940s to the mid 1990s. This could be stand-alone funding or designated to combine with existing federal programs, such as Transportation Enhancements, Safe Routes to Schools, or others.

Note: LEED certification provides independent, third-party verification that a building project meets the highest green building and performance measures. All certified projects receive a LEED plaque, which is the nationally recognized symbol demonstrating that a building is environmentally responsible, profitable and a healthy place to live and work.

Related Policies/Programs in Place

Public Transit Aids

The South Carolina Department of Transportation (SCDOT) receives funding from the Federal Transit Administration (FTA) annually for public transportation activities in South Carolina. SCDOT also receives ¼ of a cent of the State’s gasoline user fee (approximately \$6.0 million annually) and approximately \$0.1 million from the State General Fund. These state funds, together with local funds, are used to match federal funds made available under a variety of programs. (See Annex A for a description of these programs.)

Bicycle & Pedestrian

- SCDOT Commission Resolution regarding Bicycling and Walking
- Engineering Directive Memorandum 22 (Bicycling Provisions in projects)
- Complete Streets policies in place locally (e.g., CHATS, SPATS, City of Columbia)
- Biannual bicycle and pedestrian conference held by SCDOT in conjunction with a planning conference. This effort is a portion of the outreach/technical assistance effort of the pedestrian and bicycle engineer at SCDOT. The Pedestrian and Bicycle Engineer provide continuing help to local governments (municipalities, counties, MPOs and COGs) in the provision and improvement of facilities for the non-motorized modes.
- Annual Bike Month (League of American Bicyclists) and National Bike to Work Day are held during May. Many local governments promote this activity. Palmetto Cycling Coalition is a partner.
- Safe Routes to Schools office has been established at SCDOT (and all state DOTs.)

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-5	Transit & Bike-Pedestrian	Quantified as Part of TLU-4					Pending

Data Sources: Described in detail under TLU-4 above.

Quantification Methods: This policy option is expected to contribute to a stabilization of VMT per capita along with TLU-4 above. Please refer to the quantification methods under TLU-4 for details.

Key Assumptions: Described in detail under TLU-4 above.

Key Uncertainties

Described in detail under TLU-4 above.

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-6. Alternative Fuel Infrastructure

Policy Description

This policy option seeks to increase market penetration of alternative fuels in South Carolina through accelerated infrastructure development. This policy will support a diversity of supply to our transportation fuel market so that consumers have more choices in the transportation fuel they use. Additionally, this policy option will reduce GHG emissions through the increased access to cleaner burning alternative fuels.

Development of an alternative fuel infrastructure, including storage and distribution systems, can aid in the promotion of alternative fuel usage. The expense of equipment and installation costs can be offset by creating an infrastructure connecting key corridors in the southeast. The development of convenient locations of stations offering alternative fuels at competitive prices can increase the usage of the fuels. Alternative fuels include ethanol, biodiesel, compressed natural gas, propane, electricity, and hydrogen.

Policy Design

Goals:

Support the implementation of the TLU-12 goal of decreasing the net lifecycle carbon in South Carolina's total transportation fuels by 10% in 2025.

Expanding alternative fueling infrastructure is key to the increased market penetration of alternative fuels and increasing the number of alternative-fuel vehicles in South Carolina. The goals for this policy will aid decision makers, businesses, and the general public in the increased production of alternative fuels, increased fuel use, and technology necessary for the expansion of alternative fuels. Outcomes will support energy supply diversity, benefit the environment, and create economic opportunities in South Carolina.

This option is linked with TLU-11: Increased Fuel User Fee (with use of revenue for travel alternatives) and TLU-12: Low-GHG Fuel Standard.

Timing: [TBD, as needed on TWG approval]

Parties Involved: [TBD, as needed on TWG approval]

Other: [As needed]

Implementation Mechanisms

To be successful, this policy would incentivize fuel production, increased efficiency of the distribution network including bulk fuel distribution terminals, blending facilities, rail service, over the road tankers, and fueling stations. Funds for these implementation mechanisms could be generated through, for example, a portion of the fuel user fee, vehicle registrations, or CMAQ funds.

This policy would benefit from the following:

Incentives for Retailers and Distributors

- Pursue expanded incentives for retailers including tax credits, grants or low-interest loans for infrastructure installation.
- Provide state funds and/or loan guarantees for construction of storage and distribution infrastructure.
- Provide state funds for statewide marketing of availability and benefits of alternative fuels.

Incentives for Consumers

- Pursue expanded incentives for vehicle purchase and demonstrated fuel use.
- Create fuel-cost buy-down program to ensure reduced fuel costs.

Information and Education

- Use information and education outreach to encourage retailers and distributors to install infrastructure. Provide retailers, fleets and public with information on the beneficial environmental and economic effects of using alternative fuels.
- Provide alternative fuel interstate signage through state funding or reduced costs. SCDOT oversees interstate signage program. Reduced rates for alternative fuels could be implemented.

Revisions to Existing Legislation

- SC Code 12-63-20(B)(1)-(C)(2)—Remove fiscal year caps on incentive payments for retailers selling alternative fuels and modify payment date to begin July 1, 2008, as opposed to July 1, 2009.
- SC Code 12-6-3610—Remove fiscal year caps for tax credit for ethanol and biodiesel dispensing equipment.”

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Related Policies/Programs in Place

- Palmetto State Clean Fuels Coalition—a collaboration of public and private agencies and businesses working to promote the acquisition and use of alternative-fuel vehicles and to create a network of alternative fuel facilities.
- South Carolina Incentives for Fuel Production.
- South Carolina Incentives for Fuel Distribution.
- South Carolina Tax Credits for Installation of alternative fueling infrastructure.
- Federal Tax Credits for Alternative-Fuel Vehicle Refueling Property.
- South Carolina Incentives for Alternative-Fuel Vehicles.
- Federal Tax Credits for Alternative-Fuel Vehicles.
- The Energy Policy Act of 2005 includes provisions requiring an increasing volume of renewable fuel to be included in the gasoline sold in the United States. The Act instructs the Environmental Protection Agency (EPA) to establish a Renewable Fuel Standard (RFS)

program to oversee the increase. In April 2007, the EPA issued a rulemaking that requires refiners, blenders, and importers of motor vehicle fuels to increase the proportion of renewable fuel in their products.

- USDA Biomass Fuel Incentive Program.
- USDA Energy Grants and Loans.
- South Carolina DHEC UST Division Alternative Fuels Checklist for installation.
- Existing network of public and private fueling facilities.

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-6	Alternative Fuel Infrastructure	Quantified as Part of TLU-12					Pending

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Data Sources: Described in detail under TLU-12.

Quantification Methods: TLU-6 is expected to support the implementation of TLU-12 and the goal of decreasing the net lifecycle carbon in South Carolina’s total transportation fuels by 10% in 2025. Please refer to the GHG reductions estimated for TLU-12 below.

Key Assumptions: Described in detail under TLU-12.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-7. Diesel Engine Emission Reductions and Fuel Efficiency Improvements

Policy Description

Reduce diesel emissions and the use of diesel fuel in public and private sectors, both on- and off-road, through promotion of a variety of technologies that provide alternatives to diesel fuel use or greater efficiency in diesel fuel use. This option also has the collateral benefit of improving air quality and reducing air toxics exposure.

Mitigation Option Design

Promote and fund technologies that provide alternatives to petroleum diesel fuel use and greater efficiency in diesel fuel use through continued implementation of effective existing state programs and support of new state programs. These programs include

- **Multisector technologies:**
 - Broaden use of anti-idling technologies currently available but not widely used for locomotives, trucks and other diesel engines (Applicable sectors: freight, public and private fleets);
 - Engine rebuilds, repowers and replacements with more fuel efficient engines or add-on technologies (Applicable transportation sectors: ferries, freight, public and private fleets);
 - Technologies to reduce rolling resistance (such as single wide tires), low viscosity lubricants, weight reduction and improvements to aerodynamics (Applicable sectors: freight, public and private fleets);
 - Augment or replace petroleum fuel use with biodiesel, biogas, natural gas or other low carbon fuels (Applicable sectors: ferries, freight, ports, public and private fleets); and
 - Replace freight handling equipment with battery electric, hybrid or plug-in electric hybrid equipment (Applicable sectors: ports, freight).
- **Supplement Existing Programs:** Where applicable, existing effective emission reduction programs for public fleets will promote and fund the technological options listed above.
- **New Programs:** We also need new programs to reduce private fleet diesel emissions and diesel fuel use. Successful examples include programs similar to California's Carl Moyer grant program or the Texas Emission Reduction Program. Options could include development of a State Infrastructure Bank targeting low and no interest loans and revolving funds for private and public sector use to support scrapping of inefficient technology with more efficient technology.
- Other options may include placing diesel emission reduction equipment and fuel use requirements into state and local government public construction contracts to leverage private fleet conversion or creating regulatory requirements to switch fuels and retrofit existing engines and equipment in various fleet sectors.

Goals: Targets and timetables for fuel use reduction and installation of diesel idle reduction equipment in the sectors identified above are presented below. Provide funding for grant and

incentive programs to augment the current funding provided by the Legislature in the upcoming legislative session.

- Broaden use of anti-idling technologies currently available but not widely used for locomotives, trucks and other diesel engines:
 - Public fleets: 50% of vehicles by 2015 with 100% beginning in 2020.
 - Private long haul fleets and other fleets: 25% of vehicles by 2015, 50% by 2020, 75% by 2035 and 100% by 2050.
- Engine rebuilds, repowers and replacements with more fuel efficient engines or add-on technologies
 - No goals are recommended. These are primarily applicable to marine and locomotive application. Although they have some limited potential, there is little information on which to base a goal.
- Technologies to reduce rolling resistance (such as single wide tires), low viscosity lubricants, weight reduction and improvements to aerodynamics
 - Private long haul fleets: 50% of vehicles by 2015, 100% by 2020.
- Augment or replace petroleum fuel use with biodiesel, biogas, natural gas or other low carbon fuels
 - Public fleets: 100% biodiesel use (B100) by 2015
 - Private fleets: 25% B20 use by 2015, 75% B20 use by 2020 and 100% B20 use by 2035.
- Replace freight handling equipment with battery electric, hybrid or plug-in electric hybrid equipment
 - Battery: 10% of equipment by 2015, 25% by 2020, 50% by 2035
 - Diesel hybrids: 25% of equipment by 2015, 50% by 2020, reducing to 25% in 2035 and zero % in 2050 as they are replaced by plug-in hybrids.
 - Plug-in diesel hybrids: zero % in 2015, 10% by 2020, 25% by 2035 and 50% by 2050.

Timing: By 2015 with milestones.

Parties Involved: Legislature, State agencies, regional air agencies, City and County Governments, US Environmental Protection Agency, US Department of Energy, South Carolina Trucking Association, railroads, ports.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option		GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
			2012	2020	Total 2008–2020			
TLU-7	Diesel Engine Emission Reductions and Fuel Efficiency Improvements	Efficiency Improvements	0.03	0.19	0.96	-92	-96	Pending
		Biodiesel	0.05	0.38	1.95	NQ	NQ	

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Data Sources:

Vehicle population data from FHWA Highway Statistics, 2006

Vehicle annual idling hours estimated by the Puget Sound Clean Air Agency and the Washington State Department of Ecology

Truck annual mileage assumptions based on U.S. EPA, User's Guide to MOBILE6.1 and MOBILE6.2, August 2003; Bureau of Census, Vehicle Inventory and Use Survey, 2002

Current year fuel economy assumptions based on U.S. DOE, Transportation Energy Data Book, 2005 and information provided by the Puget Sound Clean Air Agency and the Washington State Department of Ecology. (Note that assumed heavy-duty vehicle fuel consumption rates are based in part on tests performed by EPA on a sample of Heavy Heavy-Duty (Class 8) trucks (greater than 33,000 lbs GVW), and may not be representative of fuel consumption rates for Medium Heavy-Duty trucks (14,000 – 33,000 lbs GVW). Therefore, the numbers presented here should be considered an estimate of the potential maximum.)

Baseline future improvements in truck fuel economy based on DOE's Annual Energy Outlook (assumes 0.57% annual improvement in heavy-duty vehicle fuel economy)

Fuel economy impacts of truck efficiency strategies based on U.S. EPA FLEET model

Impacts of biodiesel (B20) on lifecycle GHG emissions per mile (-11%) based on CCS analysis using GREET model (v1.7)

Quantification Methods:

Anti-idling-

We estimate the total gallons of diesel fuel consumed by idling, at 0.82 gallons per idling hour, using vehicle population figures and estimates of annual idling hours per vehicle. We estimate the proportion of total idling that could be reduced in each year and the resulting reduction in GHG emissions.

Cost analysis includes installation of PonyPack APU on new combination trucks, at a cost of \$5,600.

Fuel use in PonyPack is 0.2 gallons per hour, compared to average rate of 0.75 gallons per hour for the truck engine

For other heavy-duty vehicle types, no equipment installation required. Idle reduction achieved through training, education, and regulation.

Truck Efficiency-

We estimate the average improvement in truck fuel efficiency at 6%, based on data from the EPA FLEET model. We estimate the potential fuel savings for all long haul trucks registered in South Carolina and the resulting reduction in GHG emissions.

Cost estimation includes:

Installation of single-wide tires and wheels on new combination truck, in lieu of dual tires and wheels, at a cost savings of \$1040 per truck

Installation of trailer side skirts on a combination truck trailer at a cost of \$2400 and installation of NoseCone on single-unit truck at a cost of \$700

Use of low-friction engine and drive train lubricants at a cost of \$118 per year for combination trucks and \$18 per year for single-unit trucks

Biodiesel-

We estimated the total amount of diesel fuel consumed by private and public fleets after implementation of anti-idling and efficiency measures. We then calculated the additional emissions reductions from displacement of diesel fuel with biodiesel, according to the policy goals.

No cost is estimated for the biodiesel portion of this policy. Cost impacts depend on the relative prices of diesel and biodiesel in future years. Currently retail biodiesel prices are approximately in line with petro-diesel prices nationwide. There is an additional social cost of biodiesel in the form of \$1 per gallon federal subsidy.

Cargo Handling Equipment-

To quantify the impact of this measure, an emissions inventory of cargo handling equipment at SC ports is needed. Although the ports themselves own cranes and lift trucks, a majority of cargo handling equipment is private owned (Source: David Schronce, SC State Ports Authority). The additional impact of this measure is expected to be very small.

Key Assumptions:

Emission reduction benefits generally assumed to increase linearly between goal years (2015 and 2020). Emission reduction benefits for years before 2015 estimated by linear extrapolation.

Annual growth in diesel vehicle populations is 1.15%

These policies apply only to vehicles registered in the state of South Carolina.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-8. Stricter Enforcement of Speed Limits

Policy Description

Reduced vehicle speeds **can** improve fuel economy, reduce CO2 emissions, and improve safety. **In many cases, vehicle speeds** could be **reduced** by increased enforcement of existing speed limits. Significant enforcement resources spread among multiple government units may be needed for this measure to achieve the expected reductions.

Policy Design

Goals: To reduce **the average speed of speeding vehicles by** 5 miles/hour on all highways and major speedways thereby reducing emissions.

Timing: A feasibility study would need to be undertaken to determine if this might be a truly viable option.

Parties Involved: Federal, state, local governments and academic experts.

Speed reductions down to 55 mph on highways typically improve fuel efficiency in both light-duty and heavy-duty vehicles.^{16,17}

Implementation Mechanisms

Would depend on the results of the feasibility study, but would probably involve raising and deploying increased enforcement personnel, perhaps increased signage, and employing a significant public information campaign.

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

¹⁶ Center for Clean Air Policy, CCAP Guidebook Emissions Calculator, www.ccap.org/guidebook

¹⁷ Cummins, “Secrets of Better Fuel Economy,” 2006.
http://www.kenworth.com.au/kenworth/pdf/Cummins_Fuel_Economy_Guide.pdf

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-8	Stricter Enforcement of Speed Limits	0.45	0.53	5.26	NQ	NQ	Pending

Data Sources:

VMT from the South Carolina GHG Inventory and Projections

Annual VMT by vehicle and facility type from FHWA, Highway Statistics 2005 (VM-1)

Annual VMT by facility type from SCDOT projections

U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Smartway Transport Partnership, “A Glance at Clean Freight Strategies: Reducing Highway Speed,” EPA420-F-04-007, February 2004.

Center for Clean Air Policy, CCAP Guidebook Emissions Calculator, www.ccap.org/guidebook

Speed Reports from Automatic Traffic Recorders provided by SCDOT

Quantification Methods:

We calculate VMT for each future year for rural and urban highways using data on VMT by vehicle and facility type from FHWA and projections of VMT by facility type from SCDOT.

We estimate the amount of vehicle travel by light-duty and heavy-duty vehicles that could be slowed by 5 mph under the proposed policy, based on assumptions below. As a general rule, the fuel efficiency of vehicles traveling on highways increases as speeds are reduced down to 55 mph (EPA, CCAP). We assume that stricter speed enforcement would target only those vehicles traveling 5 mph or more over the speed limit on highways with limits of 55 mph or more. The average reduction in speed by targeted vehicles would be 5 mph.

We calculate the reduction in CO₂ emissions from the improved fuel economy of targeted vehicles. **Cumulative reductions are calculated beginning in 2010.**

The direct cost of this policy to public agencies will include hiring and deploying additional enforcement personnel, increasing signage, and mounting a public information campaign. The proposed feasibility study should attempt to estimate the costs of the program.

Key Assumptions:

Each one mile per hour reduction of speed from 70 mph to 55 mph yields a fuel economy increase of 0.1 miles per gallon for heavy-duty diesel trucks (EPA).

Each one mile per hour reduction of speed down to 55 mph yields a 1% reduction in CO₂ emissions per mile (CCAP).

50% of vehicle travel on South Carolina's highways and freeways occurs at speeds over 60 mph and could be slowed by stricter enforcement of existing speed limits. (This assumption is based on speed reports for a single day from 10 randomly chosen sites on SC highways. The sites represent a mix of urban and rural freeways and highways in all parts of the state).

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

Additional costs include the value of time lost due to slower travel speeds. Additional benefits include savings on fuel and potential improvements in highway safety.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-9. Make Full Use of CMAQ Funds

Policy Description

Fully allocate all Congestion Mitigation and Air Quality (CMAQ) funding to reduce transportation-related emissions and fund various emission reduction strategies with emphasis on projects that reduce GHGs. Facilitate funding of local matches to support selection and implementation of high-GHG impact projects.

Policy Design

Goals:

- Responsively expend all CMAQ funds allocated to the state to reduce emissions in accordance with Federal guidelines.
- Invest in projects and programs that reduce air pollutants in non-attainment and maintenance areas.
- Quantify emission reductions to establish prioritization of projects.
- Include public participation in diversifying projects that reduce greenhouse gas emissions.
- Increase public awareness concerning statewide strategies to reduce congestion and emissions.

Timing: Programs to achieve these goals are currently underway. During the next funding cycle, SCDOT will enhance public awareness of the air quality benefits of existing programs. The public participation process can be created immediately and implemented during each funding cycle.

Parties Involved: SCDOT, FHWA, DHEC, Statewide public participation

Other: FTA, MPOs, EPA as needed.

Implementation Mechanisms

Funding is available to states on an annual basis. The state DOT and non-attainment areas receive an allocation based on a pre-established formula. All new projects are selected, evaluated, and approved for inclusion in the Statewide Transportation Improvement Program (STIP).

Related Policies/Programs in Place

USDOT CMAQ Program

SCDOT Incident Responder Program

RFATs - CMAQ Project Funding Process

The primary purpose of the (Congestion Mitigation and Air Quality) CMAQ program is to improve air quality in areas designated by the U.S. Environmental Protection Agency (EPA) as “non-attainment” or “maintenance” by reducing transportation-related emissions. A non-attainment area is an area formally designated (in the Code of Federal Regulations) by EPA as not meeting the National Ambient Air Quality Standards (NAAQS). A maintenance area is an area that was non-attainment but has subsequently attained the NAAQS and was officially redesignated to attainment by EPA. Because CMAQ funds are intended to improve air quality, funds must be spent in non-attainment or maintenance areas.

Funding for the CMAQ Program is apportioned to states based on the population within the non-attainment areas and the severity of the air quality problem, with all states guaranteed to receive a minimum of 0.5% of each year’s Federally-approved CMAQ budget.

CMAQ funds require a state or local match. The typical split between federal and project sponsor is 80% Federal, 20% State and/or local match.

Funds are apportioned to the State DOTs on an annual basis. Once the funds are apportioned to the State DOT, they are available for four years, and may be “obligated” or dedicated, to specific CMAQ projects. Eligible projects include

- Transit and Public Transportation Programs
- Traffic Flow Improvements
- Travel Demand Management Strategies
- Ride Sharing Programs
- Pedestrian and Bicycle Programs
- Education and Outreach
- Inspection and Maintenance Programs
- Extreme Cold Start Programs
- Alternative “Clean” Fuels
- Public/Private Partnerships
- Experimental Pilot Projects

Each of the last three years South Carolina has received approximately \$10 million in CMAQ contract authority. Taking into account obligation limitations and other federal rescissions, the total amount of CMAQ funding to the state is a yearly matched total of approximately \$7.7 million. Subtracting the matched mandatory amount of \$2.5 million (\$2 million federal) for York County, approximately \$5.2 million annually in matched CMAQ discretionary funds remain for the Statewide Motor Assistance Program (MAP).

SCDOT realized that consequences from highway incidents include traffic congestion, increased fuel consumption, and more air-polluting emissions. A single incident can cause traffic delays that can result in devastating secondary incidents. Minimizing the time needed to return a highway to normal flow can greatly reduce traffic delays and the negative impacts on both highway travelers and the environment. The MAP was created and implemented as an incident management tool to assist with traffic flow. The program covers over 400 miles and operates seven days a week on many of South Carolina’s interstate and primary routes. SCDOT’s MAP

serves motorists traveling in the Beaufort, Charleston, Columbia, Florence, Grand Strand/Myrtle Beach, Rock Hill, and Greenville/Spartanburg urban areas.

In July 2007, the EPA proposed to make revisions to the NAAQS that would make more stringent the 8-hour ozone standard. Should the EPA ultimately adopt the lowest standards proposed, the result would be that all counties with air quality monitors in South Carolina, would exceed the new standards. Because the resultant non-attainment designations may include several counties, even those without monitors, or partial counties, it is feasible that many counties in South Carolina would then be designated non-attainment. While this proposal has yet to be finalized by the EPA, the potential impacts to South Carolina would require close attention.

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-9	Make Full Use of CMAQ funds	Not quantified					Pending

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Data Sources: None.

Quantification Methods: This policy is not quantified because it does not specify any particular types of projects or programs to reduce GHG emissions. The policy will likely support the achievement of emissions reductions estimated for other policies, including TLU-2, TLU-4, and TLU-5.

Key Assumptions: [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-10. Commuter Choice

Policy Description

Enable employers to provide options such as telecommuting, transit subsidies, pre-tax transit fare program, parking cash-out, and guaranteed ride-home service in order to reduce Single Occupant Vehicle (SOV) commutes through the implementation of *Commuter Choice* and *Commuter Benefits* programs. Certain of these programs would be applicable to both the public and private sectors. Others would be specific to one or the other.

[**Note:** The programs and actions recommended under this policy complement the programs and actions recommended under TLU-2: Transportation System Management, TLU-4: Improve Development Patterns, and TLU-5: Transit & Bike-Pedestrian.]

Policy Design

Goals: Enable all employers in the state with over 150 employees to provide options for employees such as transit contracts, pre-telecommuting in order to reduce SOV commutes and thereby reduce GHG emissions.

The *Commuter Benefits* programs provide employees with alternative transportation options and incentives under programs such as:

- Employers contracting with transit agencies to provide service directly to employment centers.
- Carpools.
- Providing pre-tax transit fare programs.
- Providing parking cash-out programs.
- Providing guaranteed ride-home service.

Under the *Commuter Benefits* options listed above, the total amount of commute trip-making by employees would not be reduced. Rather, the trip-making would be consolidated onto fewer vehicles and thereby decrease in total vehicle miles of travel.

The *Commuter Choice* programs, on the other hand, are designed to reduce total trip-making by substituting telecommuting for employee trip-making to and from a place of employment. The telecommuting option includes the development and use of neighborhood telecommuting centers that offer office-type services in locations close to commuters' residences. As an incentive to develop and provide such services, a tax credit can be offered to companies. Government spending to encourage commuter choice can stimulate a large private-sector match

Timing: The timing for creating and implementing the above listed programs will vary because many will require the enactment of legislation and the promulgation of regulations.

Parties Involved: Governor's Office, Cabinet Agencies, and all other state agencies, South Carolina Legislature, counties and municipalities, school districts, universities and colleges, mass transit agencies and providers, private sector employers.

Other:

Implementation Mechanisms

Commuter Benefits Programs

- Enact legislation to require that all private sector employers over 50 employees offer Commuter Benefits programs.
- Enact legislation to require that all colleges and universities offer Commuter Benefits programs.
- Enact legislation to require that all state agencies, counties and municipalities offer Commuter Benefits programs.
- Enact legislation to require that all school districts offer Commuter Benefits programs.
- Enact legislation to require that all state agencies charge appropriate parking fees to cover the costs of constructing and maintaining parking lots and/or facilities for employees.
- Enact legislation creating a state vanpool program.

Commuter Choice Programs

- State establishes a public/private partnership to develop and run telecommuting centers that offer office-type services in locations close to commuters' residences.
- State would establish best practices in Transportation Demand Management (TDM) and assist employers of over 500 employees in developing and implementing TDM plans.

Related Policies/Programs in Place

- IRS Section 132(f) of the Internal Revenue Code
- EPA—Best Workplaces for Commuterssm Program
- SmartRide Program (Camden/Lugoff to Columbia) (Newberry/Little Mountain/Chapin to Columbia)
- Charleston Park and Ride
- City of Rock Hill Park and Ride

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input/approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-10	Commuter Choice	0.11	0.43	2.51	-516	-240	Pending

Data Sources:

- Employment figures from County Business Patterns 2005 and South Carolina Employment Security Commission.
- Employment Projections 2006–2016, BLS. December 4, 2007.
- Average daily commute trip length in South Carolina from National Household Travel Survey (NHTS) 2001.
- EPA Commuter Model
- **Best Workplaces for Commuters Business Savings Calculator.**
<http://www.bwc.gov/resource/calc.htm>

Quantification Methods:

We calculate the number of employees affected by the policy statewide. 890,000 people work for non-government employers who have more than 50 employees. An additional 300,000 people are employed by state and local governments. Therefore, this policy would apply to a total of 1.2 million workers statewide, or more than half the state’s employed workers.

We apply annual employment growth rates from the BLS to calculate affected employees in each year to 2020. We calculate the total commute trip VMT of these employees using average trip lengths from the NHTS.

The success of this policy depends heavily on the availability of alternatives to driving alone to work. Possible alternatives include carpooling, transit, walking, bicycling, and telecommuting. At present, many urban and rural locations in South Carolina offer few viable alternatives to driving alone to work. To calculate the VMT reduction from commuter benefit programs, we assume a ramp-up period to 11.5% reduction in 2020. The ability of the average employer to reduce employees’ VMT by this amount will depend upon the implementation of other policies, particularly TLU-5, Transit & Bike-Pedestrian.

We consider the first order costs and benefits of commuter benefits programs. Cost to employers includes any cash incentives to employees, as well as administrative costs and some small capital costs. Employers save money on parking facilities and, in the case of telecommuter incentives, on office space. The net cost to employers is around –\$100/ton for the scenarios considered. Cost to employees is simply the value of cash incentives. The

average was –\$140 per ton. We did not consider any foregone state and federal tax revenue.¹⁸

Key Assumptions:

Average reduction in employee VMT by employers providing commuter benefits programs is 11.5%. (Assumption based on average results of several possible program configurations **for businesses in downtown, urban, and suburban locations**, as determined by EPA’s Commuter model.)

All commercial establishments with 50 or more employees will provide benefits. All state and local government agencies, colleges, universities, and schools will provide benefits.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

Any reduction in miles driven results in a net savings to drivers, due to savings on gas and vehicle maintenance. The value of this benefit is in the range of \$600 per ton of GHGs.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

¹⁸ Calculated using the Best Workplaces for Commuters Business Savings Calculator.
<http://www.bwc.gov/resource/calc.htm>

TLU-11. Explore Available Resources for Funding Road Maintenance and Mass Transportation

Policy Description

Increasing the state user fee on conventional fuels can reduce fuel consumption and travel by encouraging travelers to use more fuel-efficient vehicles, carpool, use alternative fuels, ride public transit, combine trips, walk or bicycle for short trips, and eliminate unnecessary vehicle travel. In addition, revenues can be used to fund transit and other transportation alternatives within a corridor or region, to provide tax credits to encourage consumers to purchase more fuel-efficient vehicles, as well as to improve maintenance conditions of the highway system.

Policy Design

Goals: Four goals are addressed by this policy:

- Reduce fuel consumption by shifting drivers to more energy efficient vehicles and more energy efficient travel modes;
- Improve availability of mass transit by making more funding available to cover operating costs of high-quality transit services;
- Reduce peak period traffic congestion – which also reduces energy consumption -- by shifting travel to modes that consume less highway capacity per user.
- Provide adequate funding for timely highway maintenance, which avoids the excess energy and material inputs required to reconstruct roads that are allowed to deteriorate to the point that simple repaving will not correct maintenance deficiencies.

Timing: [TBD, as needed on TWG approval]

Parties Involved: Elected officials at all levels, but primarily state legislature; SCDOT Division of Mass Transit; local transit operators

Other:

The gas user fee proposed is 5.4 cents per gallon for maintenance expenses and 1.75 cents for transit.

The following is an estimate of the current fuel user fee rates and uses in effect in South Carolina.

Table 3. Estimate of current fuel user fee rates and uses in South Carolina

	Fuel User Fee Rates (cents/gallon)	
	Gasoline	Diesel
Federal	18.40	24.40
South Carolina	16.75	16.75
Total	35.15	41.15

Uses of South Carolina Fuel User Fee		
"C" Funds to Counties	2.66	cents
Transit	0.25	cents
Admin Costs for Revenue Collection	0.75	cents
Balance to SCDOT?	13.09	cents
Total	16.75	cents/ gallon
Estimated revenue to SCDOT annually	418.88	million

Implementation Mechanisms

While politically charged, if approved by elected governing officials, gasoline user fee increases can be implemented easily and require little or no additional overhead expense to collect.

To implement the transit elements of this policy, SCDOT and local transit officials would need to examine and, if necessary, adjust the existing formula for allocating the ¼ cent of the state gasoline user fee currently dedicated to transit. Local transit providers would be required to develop implementation plans for new services, and to order necessary equipment and vehicles. A good performance monitoring system should be established to ensure transit services are effective and operate efficiently.

To help reduce the impact on drivers, could be paired with a fuel efficient vehicle tax credits, (see discussion in TLU 3).

A linkage between energy use and timely highway maintenance may be difficult to quantify, but appears clearly to exist. Currently, inadequate funding for highway maintenance is leading to accelerated deterioration of the state's highway infrastructure. Repaving (or "resurfacing") is a routine maintenance activity, analogous to re-roofing a house. If the maintenance is deferred for too long, the underlying structure is damaged. In a house, this may mean replacing sheathing and rafters in addition to shingles. On a road, deferred maintenance results in major repairs to or complete reconstruction of the base layers of the road. Far more materials, transportation energy, and construction energy are required as a result. To implement a program that improved highway maintenance as a GHG reduction strategy would require some assurance that the additional funds would produce a net increase in maintenance funding, and not a shift of existing funding to other transportation programs.

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input/approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-11	Explore Available Resources for Funding Road Maintenance and Mass Transportation	0.06	0.34	1.82	0	0	Pending

Data Sources:

National fuel price forecasts from the Energy Information Administration’s Annual Energy Outlook 2006.

Current fuel prices in South Carolina from the Energy Information Administration’s Petroleum Prices, Sales Volumes & Stocks by State.

Quantification Methods:

A wide body of research examines consumers’ responses to higher fuel prices. Elasticities measure the decrease in VMT induced by an increase in fuel price. The work of Ken Small is regarded as particularly authoritative on this topic. Small provides separate elasticity values for short and long term responses to increased fuel prices.¹⁹ For each 1% increase in fuel price, VMT falls by 0.09% in the short term. In the long term, a 1% increase in fuel price induces a 0.43% decrease in VMT

Short-term elasticity: –0.09

Long-term elasticity: –0.43

In the short term, consumers respond to fuel price increases by reducing or shortening unnecessary vehicle trips. In the long term, consumers respond to higher fuel prices by purchasing more fuel efficient vehicles, living closer to work, switching to alternate modes, etc.

We forecast gasoline prices in South Carolina using the EIA’s national forecast and the current differential between national average prices and fuel prices in South Carolina. The calculated differential is based on pre-user fee prices. On average the pre-user fee price for a gallon of gasoline was 8.4% lower than the national average price in 2005 and 2006.

¹⁹ Small, Kenneth A. and Van Dender, Kurt. “Fuel Efficiency and Motor Vehicle Travel: The Declining Rebound Effect.” July 17, 2006.

We estimate the consumer response (elasticity) to the fuel price increase of 7.15 cents per gallon in each year based on a transition from short-term responses to long-term responses. GHG emission reductions are estimated based on projected VMT reductions due to higher fuel prices.

An existing user fee like this is correctly viewed as a transfer, with neither costs nor benefits until the revenue is spent. As such, we show a net zero cost.

Key Assumptions: Long-term consumer responses begin after 5 years, in 2013. Full long-term effects are realized by 2020.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-12. Low-GHG Fuel Standard

Policy Description

This option seeks to reduce GHG emissions by decreasing the carbon intensity of all passenger vehicle fuels sold in the state. To accomplish this end, South Carolina should observe the California plan to reduce GHG fuel emissions as it is put into practice and note the real world successes and failures of that template. A low-GHG fuel standard in South Carolina must take into consideration the state's dependence upon Gulf Coast refineries and upon existing transportation system via two major pipelines originating in the Gulf and terminating in the New York harbor. Incentivizing the production, development and marketing of low GHG fuels should continue and will promote its availability and use.

There is also a need to acknowledge regional assets in the development of specific fuels and use the state's resources to stimulate technological innovation to further develop these fuels.

Policy Design

Goals:

To reduce carbon intensity of South Carolina's on-road vehicle fuels by at least 10% by 2020.

Timing: [TBD, as needed on TWG approval]

Parties Involved: [TBD, as needed on TWG approval]

Other: It may not be possible to meet the ambitious goal as laid out in California's Low GHG Fuel Standard because their standard will be implemented and measured in California on a lifecycle basis in order to include all emissions from fuel production to consumption. There are key differences between the lifecycle of fuels in California and South Carolina. In particular,

- California has a number of refineries whereas South Carolina depends on refineries along the gulf state, and
- California has a pipeline system that is internal whereas South Carolina's pipeline links South Carolina to the gulf states.

Implementation Mechanisms

Identify potential low GHG fuels that are available in this region of the country, such as ethanol from cellulosic sources, biodiesel from soy beans, wind, and solar. The state needs to provide incentives for the further development of these fuel sources to make them available and sustainable. The state should continue its financial commitment to the development of hydrogen in fuel cell technology to hasten its practical use as a transportation fuel.

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-12	Low-GHG Fuel Standard	0.35	3.57	17.07	NQ	NQ	Pending

Data Sources:

On-road GHG emissions from the South Carolina Inventory and Projections

Quantification Methods:

The result of the 10% reduction in carbon intensity is based upon the current carbon intensity for vehicle fuels in South Carolina and the forecast levels of fuel consumption for the horizon year. A ramp-up period is estimated so that the 10% goal would be reached at the horizon year, 2020.

Key Assumptions:

Program applies to both heavy-duty and light-duty vehicles.

Reductions in fuel carbon intensity begin in 2012.

Key Uncertainties

Transportation fuel providers would need to change their production and distribution methods to achieve the goals. Because the policy does not prescribe particular technology pathways, and because technology in this area is changing quickly, there is substantial uncertainty about which fuels and technologies fuel providers will use to meet the standard. The program assumes that providers will use the most cost-effective options to meet the standard, but compliance costs are unknown at this time.

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-13. Commercial Vehicle Technology Improvements

This option has been proposed for combination with TLU-7.

Policy Description

Over the past several years, and particularly since diesel fuel prices have increased exponentially, truck owners and operators have accelerated their use of fuel savings techniques, devices and technology. They have also have every reason to shut off their engines when it is practical and economical to do so.

Truck fuel efficiency overall can be improved using a variety of equipment modifications as well as driver training. Government agencies can promote truck fuel efficiency improvements with incentives and outreach.

The private sector, along with trade groups and vendors offer training and education as to technologies currently available and under development. Manufacturers and vendors are constantly marketing their products, some of which work, others either don't or haven't been subject to adequate testing.

Policy Design

- Truck tractors and trailers can be bought, or retrofitted, with aerodynamic devices.
- Wide-based (super-single) tires in some applications can prove to save fuel.
- The makers of some lubricants claim they produce savings.
- Owner operators and small fleet owners would benefit from training programs.
- Commercial vehicle size and weight increases could improve the efficiency of freight movement and increase its productivity, while mitigating the effects of growing freight transportation demands.

Goals: [CCS drafts based on inputs from volunteers for straw proposals and then moves proposed text to the full TWG for review/revision, then on to the CECAC at the next meeting].

Timing: [TBD, as needed on TWG approval]

Parties Involved: [TBD, as needed on TWG approval]

Other: [As needed]

Implementation Mechanisms

1-A. Wind shields and skirting can be applied to reduce wind resistance and improve fuel economy. The manufacturers and vendors of these products actively market them. A cost-benefit analysis would have to be used to determine if such equipment should be placed on older equipment, or if they make sense for a particular operation.

- 1-B. New trucks should be and most are equipped with such devices if it makes sense in a particular operation.
- 1-C. New and Used truck dealers could be approached to promote the use of these devices with their customers.
- 2-A. Super-Single/wide-based tires are proving to be fuel efficient in many applications. The federal tax on tires has been changed to make them more attractive. Manufacturers are actively marketing these products.
- 3-A. The manufacturers of some truck engine and component lubricants claim their products can save fuel. Studies could be conducted and the results could be distributed. OEM warranties on engines and components must be considered. The makers of such products are promoting the benefits in the marketplace.
- 4-A. Owner operators and small fleet owners would benefit from government training programs, outreach and materials designed to educate them and their drivers on fuel savings to be achieved through various driver-related strategies. The private sector, particularly vendors and trade associations, provides some, but the government could offer more help in this regard.
- 4-B. Equipment and technology-related training, materials and outreach strategies could help these small businesses.
- 5-A. Increasing the sizes and weights allowed for commercial vehicles would help mitigate the impact these freight hauling vehicles have on traffic congestion, allowing fewer vehicles to haul the same amount of cargo. These more productive vehicles would burn less fuel and emit fewer pollutants, while hauling more cargo, thereby reducing the number of trucks required to move the same amount of goods.
- 5-B. Increase truck weights to 97,000 pounds GVW and allow longer combination units (long doubles and triples units) to operate.

The TWG suggests that these initiatives and other grants, tax incentives, and other measures be considered/included here and/or under TLU-3 and TLU-7.

Combining fuel savings and emission reduction proposals should be considered.

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-13	Freight Vehicle Technology Improvements	Quantified as part of TLU-7					Pending

Data Sources: [TBD by CCS on TWG approval]

Quantification Methods: [e.g., Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

TLU-14. Rail

Policy Description

Rail transport is one of the most energy efficient means to move people and freight over commonly traveled routes on land. Improved freight rail service and new passenger rail services have the potential to reduce overall greenhouse gas emissions compared to movement by highway. Technology improvements, such as anti-idle devices and more efficient engines, can reduce direct emissions from locomotives operating on the rail network. A robust and efficient rail network can play a key role in sustaining South Carolina's economy under future carbon emission constraints while providing many social, economic, and environmental benefits.

Policy Design

Freight rail service in South Carolina provides a combination of statewide and regional transportation functions. Nearly all of the state's freight rail system is owned, operated, and maintained by the private sector. Rail facilities are operated by two Class I railroads, CSX Transportation and Norfolk Southern, and 11 short-line railroads. Class I railroads operate 2,058 miles of track and short lines operate 319 miles, for a total of 2,377 state freight rail miles.

The soon-to-be completed State Multimodal Transportation Plan addresses the potential for both intermodal freight and intermodal passenger facilities in certain high density travel corridors of the state. The primary focus of the new state plan is, however, the state highway and mass transit systems. A detailed analysis of the state's rail system was not undertaken and is not included as part of the Multimodal Plan.

Because a detailed and comprehensive analysis of South Carolina's rail system and its role in the movement of people and goods does not currently exist, the TLU TWG does not have sufficient readily available information to use in the development of specific policy recommendations for the rail mode. The TLU TWG does, however, recommend that a detailed and comprehensive analysis of the state's rail system be undertaken immediately.

Goals:

Prepare a State Rail Plan for South Carolina that provides broad, strategic direction for the collaborative development of an integrated rail system that efficiently moves goods and people throughout the state and beyond. This direction is needed so that the impact of an intermodal transportation network is maximized to enhance South Carolina's economic development and mobility needs.

The State Rail Plan should explicitly address the following:

- Freight Rail Infrastructure & Operations
 - Existing Conditions and Review of Previous Studies
 - Present and Future Needs Assessment
- High-Speed / Commuter Rail Infrastructure & Operations

- Existing Conditions and Review of Previous Studies
- Present and Future Needs Assessment
- Intermodal Connectivity
 - Opportunities for connectivity to ports, airports, highways and transit
- Right-of-Way Preservation
 - Review of Rail Right-of-Way Inventory
 - Strategic Preservation and Possible Rail Banking
- Rail Relocation
 - Location/Definition of Need and Resultant Impact(s)
- Safety (Crossings, Operations, etc.)
 - Existing Conditions
 - Present and Future Needs Assessment
- Emergency Preparedness
 - Evacuation, Security and Defense Utilization
- Regulations and Oversight Structure
 - Federal and State
 - Identification and Analysis of State Agency Roles
- Statewide Needs vs. Available Funding Analysis
 - Prioritization of Project Needs and Identification of Available Funding
- Funding Opportunities
 - Federal, State, Local Opportunities
 - Partnership Opportunities with Freight Railroads and Private Interests
- Recommendations
 - Strategies and Projects
 - Funding and Oversight

While not explicitly identified above, a public involvement plan would be developed at the outset and implemented throughout the planning process in order to successfully forge ongoing public and private partnerships. At the outset of the process, key public and private stakeholders would be identified and invited to participate. Key stakeholders would include railroads and business interests and state agencies.

Timing:

Assuming that S.585 is passed by the South Carolina Legislature during its current session, the State Rail Plan would be completed the end of calendar year 2009. [For details about S. 585, see *Implementation Mechanisms* below.]

Parties Involved: Governor's Office and Cabinet Agencies such as SCDOT and South Carolina Department of Commerce, South Carolina Legislature, metropolitan planning organizations,

Councils of Governments, local units of government (i.e., municipalities and counties), economic development councils, private sector businesses and manufacturers, railroads (including Amtrak), South Carolina Port Authority.

Other:

Federal transportation agencies such as the Federal Highway Administration, the Federal Transit Administration, and the Federal Railroad Administration.

Implementation Mechanisms

The primary implementation mechanism would be passage of an amended version of S. 585 with sufficient funding by the current session of the South Carolina Legislature.

S. 585 is a Joint Resolution directing the Department of Commerce to prepare a statewide rail plan. It was passed by the Senate in June, 2007 and referred to the House. The TLU TWG believes that S. 585 should be amended to specify that SCDOT be either the co-lead agency or the lead agency for preparation of the statewide rail plan. This amendment will ensure that the State Rail Plan will benefit directly from the SCDOT's soon-to-be adopted Statewide Transportation Plan that addresses corridor, transit, and rail ROW planning across the state and will address all of the issues identified in the above outline.

Related Policies/Programs in Place

Passenger rail service in South Carolina is currently limited to Amtrak's long-distance trains passing through the state. These trains are

- Crescent—Service between New York and New Orleans with stops in Spartanburg, Greenville, and Clemson.
- Silver Star—Service between New York and Miami with stops in Camden, Columbia, and Denmark.
- Silver Meteor—Service between New York and Miami with stops in Dillon, Florence, Kingstree, North Charleston, and Yemassee.
- Palmetto—Service between New York and Miami with stops in Dillon, Florence, Kingstree, North Charleston, and Yemassee.

The *Southeast High Speed Rail Corridor* encompasses two distinct corridors through South Carolina. One is from Washington, DC, to Raleigh to Atlanta passing through the Upstate (Spartanburg and Greenville). The other is from Washington DC to Raleigh to Savannah to Jacksonville passing through the Central Midlands (Columbia). Virginia, North Carolina, South Carolina and Georgia have joined together with the business communities in each state to form a four-state coalition to plan, develop and implement high speed rail in the Southeast. The system will be developed incrementally, upgrading existing rail rights-of-way. To date, the coalition's efforts have focused on the Washington, DC, to Raleigh to Atlanta segment of the corridor.

In September 2005, the Georgia, South Carolina, and North Carolina DOTs contracted with the USDOT's Volpe Center to evaluate the overall suitability and costs of developing high-speed passenger train service between Charlotte, Atlanta, and Macon. The analysis will (1) recommend

rail top speeds and technologies that balance potential ridership and revenues with infrastructure and operating costs, (2) forecast ridership over at least a 25-year time horizon, (3) assess whether operating revenues might exceed operating costs and infrastructure maintenance costs, (4) compare this corridor’s performance with similar rail corridors in other regions, and (5) determine other quantifiable economic impacts of high speed rail corridor investments. The Volpe Center’s report is expected to be released in early 2008.

Two metropolitan areas in South Carolina, Charleston and Columbia, have completed preliminary evaluations of the feasibility of commuter rail service within their respective urban areas. In order to qualify for federal funding, any proposed commuter rail project must comply with a rigorous planning process prescribed by law and by USDOT regulations. The first step in this planning process is the completion of an Alternatives Analysis. The MPO for the Charleston area has received federal funding to conduct an Alternatives Analysis for the Charleston to Summerville corridor. The MPO for the Columbia area has not yet received any federal funding for a comparable analysis of the Columbia to Camden rail corridor.

Type(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Option No.	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
TLU-14	Rail	Not quantified					Pending

Estimation of the emission reduction potential of this option would require a strategic study of potential passenger and freight rail demand in South Carolina. The State Rail Plan should address this need.

Data Sources: [TBD by CCS on TWG approval]

Quantification Methods: [e.g. Full life cycle analysis with supply/demand equilibrium adjustments on TWG approval]

Key Assumptions: [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until CECAC Meeting #5 or #6]

Barriers to Consensus

TBD – [blank until final vote by the CECAC]

Annex A: Federal Transit Aids [Annex to TLU 5: Transit & Bike-Pedestrian]

SECTION 5303: Metropolitan Planning Program

Eligible Recipients: Metropolitan Planning Organizations (MPOs).

Guidelines: This program provides for transportation planning activities within the urbanized areas of the State. An allocation is distributed to each state based on the state's urbanized area population as defined by the U.S. Census Bureau. Each state, in cooperation with the MPOs, must develop an allocation formula. This formula must be approved by FTA and ensure to the maximum extent possible that no MPO is allocated less than the base amount received by administrative formula under the FY 1991 allocation. Beginning FY 2008, this program will be administered by the SCDOT Planning Office under the consolidated planning grant.

Allocation of Funding: Funds are allocated by formula. The formula is similar to the formula used to distribute the Federal Highway Administration planning funds.

Match: The federal share is 80%; the local share is 20%. The State does not provide match for this program; therefore, MPOs must provide the entire 20% local match.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.

SECTION 5304: Statewide Planning and Research Program

Eligible recipients: Public bodies and private nonprofit organizations.

Guidelines: This program supports statewide public transit projects. Projects may include statewide transit planning, management training, service development, workshops, and cooperative research. In addition, the State may use a portion of these funds to supplement metropolitan planning funds allocated by the State to its urbanized areas, as appropriate.

Allocation of Funding: Federal funds are allocated by formula.

Match: The federal share is 80% and requires an additional 20% match.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.

SECTION 5307: Urbanized Area Formula Program

Eligible Recipients: The Governor, or the Governor's designee, is the designated recipient for urbanized areas with populations between 50,000 and 200,000. Funds are made available to designated recipients with legal authority to receive and dispense federal funds; i.e. local officials and publicly owned operators representing urbanized areas with populations greater than 50,000. Generally, a transportation management area is an urbanized area with populations of 200,000 and greater.

Category 1: Large Urbanized Area (Population greater than 200,000). These areas include Charleston, Columbia, and Greenville. In this category, urbanized areas deal directly with the FTA.

Category 2: Small Urbanized Areas (Population 50,000–200,000). These areas include Anderson, Florence, Myrtle Beach, Rock Hill, Spartanburg, and Sumter. In this category, funds are apportioned to the Governor of each state. This responsibility has been delegated to SCDOT.

Guidelines: Federal funding is apportioned to the State on the basis of legislative formulas. For areas of 50,000 - 199,999 in population, the formula is based on population and population density. For areas with populations of 200,000 and greater, the formula is based on a combination of bus revenue vehicle miles, bus passenger miles, fixed guideway revenue vehicle miles, and fixed guideway route miles, as well as population and population density. These funds are used with transit capital or operating expenses and planning.

Match: The federal share should not exceed 80% of the new project cost for capital or planning. The federal share may be 90% for the cost of vehicle-related equipment attributed to compliance with the ADA and the Clean Air Act. The federal share may also be 90% for projects or portions of projects related to bicycles. The federal share may not exceed 50% of the new project cost of operating assistance. Large urbanized areas are exempted from receiving operating assistance.

State Share:

- Large Urbanized Area—current formula provides up to 25% of the available State Mass Transit Funds.
- Small Urbanized Area—current formula provides 19% of the available State Mass Transit Funds.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.

SECTION 5309: Discretionary Funds)

Eligible Recipients: SCDOT and public transportation providers.

Guidelines: Funding for this program must be used for mass transit capital projects only, such as buses, computer equipment, rail projects, transit facility projects, etc.

Allocation of Funding: Congress controls earmark funds to states for specific projects through appropriation. These funds are dispersed based on need and requests.

Match: The maximum federal share is 80%; the local share is at least 20%. (New start projects can have a different ratio, receiving greater local shares.) The state may provide a 10% match, if available; otherwise, the agency must provide the entire 20% match.

SECTION 5310: Elderly Individuals and Individuals with Disabilities Program

Eligible Recipients: Private, nonprofit organizations, and public bodies that certify to the governor that no nonprofit corporations or associations are readily available in an area to provide the service (i.e., Councils on Aging, Disabilities and Special Needs Boards, local and public agencies).

Guidelines: These funds are used to assist private nonprofit agencies, local and public agencies in meeting the transportation needs of the elderly individuals and individuals with disabilities. Most of the funds are used for purchase of service contracts from other providers and/or purchase of vehicles. Funds may also be used for mobility management. This program allows up to 10% of the apportionment for state administration.

Allocation of Funding: Federal funds are allocated by formula that considers the number of elderly individuals and individuals with disabilities in each state.

Match: The federal share is 80%; local share is 20%. The State does not provide match for this program; therefore, human service agencies must provide the entire 20% local match.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.

SECTION 5311: Rural and Small Urban Areas

Eligible Recipients: Local governments, nonprofit organizations (including Indian tribes and groups), and public transit operators in areas with populations less than 50,000.

Guidelines: Funding for this program is made available through formula grants to states. Funds may be distributed to public, private for-profit, or tribal organizations and used for administration, operations, or capital. Additional funding is made available through the Section 5311 Program grant to support the state's rural training and technical assistance programs. These funds are distributed to public, private for-profit or tribal organizations under the RTAP guidelines.

Allocation of Funding: Funding is appropriated by a statutory formula that is based on the latest U.S. Census Bureau figures of areas with populations less than 50,000. The amount that the state may use for state administration, planning, and technical assistance activities is limited to 15% of the annual apportionment. States must spend 15% of the apportionment to support rural intercity bus service, unless its governor certifies that the intercity bus needs of the state are adequately met. At the state level, a formula is derived to further distribute the funds to rural transit providers.

Match: The maximum federal share for capital and project administration is 80% (except for equipment designed to meet the requirements of the ADA, the Clean Air Act, or bicycle access projects, which may be funded at up to 90%). The maximum federal share for operating assistance is 50% of the net operating costs. The local share is 50%, which comes from program income, county/city allocation, and contract revenue. State funds are made available based on the rural transit funding formula.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.

SECTION 5311 (b)(3): Rural Transit Assistance Program (RTAP)

Eligible recipients: States, local governments, and local transit operators.

Guidelines: This program provides funding to assist in the development and implementation of training and technical assistance and other support services tailored to meet the specific needs of transit operators in non-urbanized areas.

Allocation of Funding: Used to support statewide initiatives and training efforts of transit operators.

Match: There is no local match required under this program.

Funding Availability: Funds are available the year appropriated, plus two years, for a total of three years of available funding.

SECTION 5316: Job Access and Reverse Commute (JARC) Program

Eligible Recipients: Private nonprofit organizations, state or local governmental authorities, and public and private operators of public transportation services.

Guidelines: Reverse Commute grants are designated to develop transit services to transport workers to suburban job sites. Eligible activities for Job Access grants include capital and operating costs of equipment, facilities, and associated capital maintenance items related to providing access to jobs. Also included are the costs of promoting the use of transit by workers with nontraditional work schedules, promoting the use of transit vouchers, and promoting the use of employer-provided transportation, including the transit benefits. For Reverse Commute grants, the following activities are eligible: operating costs, capital costs, and other costs associated with reverse commute by bus, train, carpool, van, mobility management, or other transit service.

Allocation of Funding: Through FTA formula. SCDOT, in partnership with local agencies, is responsible for a competitive selection process when funding this program.

Match: 80% federal for capital and 50% for operating. Recipients can use up to 10% for administration at a 100% federal share.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.

SECTION 5317: New Freedom Program

Eligible Recipients: Private nonprofit organizations, state or local governmental authorities, and public and private operators of public transportation services.

Guidelines: The designated recipients are responsible for conducting the competitive selection process. Eligible activities encourage services and facility improvements to address

the transportation needs of individuals with disabilities that go beyond those required by the ADA. The following activities are eligible: operating costs, capital costs and mobility management costs.

Allocation of Funding: Through FTA formula. SCDOT, in partnership with local agencies, is responsible for a competitive selection process when funding this program.

Match: For capital, the federal share is 80% and the local share is 20%; for operating, the federal share is 50% and local share is 50%. The State can use up to 10% for state administration at a 100% federal share with no match.

Funding Availability: Funds are available the year appropriated, plus three years, for a total of four years of available funding.