Table 3.
Transportation and Land Use Technical Work Group
Summary List of Pending Policy Options

#	Policy Name	2012 GHG Savings ($MMtCO_2e$)	2020 GHG Savings ($MMtCO_2e$)	2007-2020 GHG Savings ($MMtCO_2e$)	Cost-Effectiveness ($\$/MtCO_2e$)
TLU-1	State Clean Car Program	0.4	1.9	10.5	-$115
TLU-2	Low Rolling Resistance Tires	0.0	0.3	3.5	-$61
TLU-3	*Procurement of Efficient Fleet Vehicles*	*In progress*			
TLU-4	Pay-As-You-Drive Insurance	0.15 – 0.63	0.19 – 0.79	In progress	Zero net cost
TLU-5	Incentive/Disincentive Options Bundle	0.1	0.1	In progress	In progress
TLU-6	Alternative Fuels Use [6a] Alternative Fuel Production [6b]	2.1	4.7	35.8	Zero net cost

#	Policy Name	2012 GHG Savings ($MMtCO_2e$)	2020 GHG Savings ($MMtCO_2e$)	2007-2020 GHG Savings ($MMtCO_2e$)	Cost-Effectiveness ($/$MtCO_2e$)
	VMT Reduction Bundle TLU-7 to TLU-12				
TLU-7	Infill, Brownfield Re-development	1.2	1.3	13.5	In progress
TLU-8	Transit-Oriented Development				
TLU-9	Smart Growth Planning, Modeling, Tools				
TLU-10	Multimodal Transportation Bundle				
TLU-11	*GHG Offset Requirements for Large Developments [in progress]*				
TLU-12	*Targeted Open Space and Croplands Protection [in progress]*				
TLU-13	Diesel Retrofits	0.041	0.003	0.331	In progress
TLU-14	Truck Stop Electrification/Anti-Idling	0.34	0.49	5.1	$4 at $2.40/gal $-66 at $3.40/gal
TLU-15	Intermodal Freight Initiatives	In progress			
TLU-16	Lower Speed Limit for Commercial Trucks	0.14-0.18	0.22-0.30	2.2-3.0	$50 at $2.40/gal $-19 at $3.40/gal

TLU-1 California GHG Emission Standards

Policy Description:

Adopt the California GHG emission standards (also known as the "Pavley" standards or "Clean Car Program") in order to reduce the net emissions of GHG's from passenger vehicle operation.

Policy Design:

New cars and light trucks in all states must comply with Federal emission standards, and, generally speaking, states have the choice of adopting a stronger set of standards applicable in California. In 2005, California finalized a set of standards that would require reductions of GHG emissions of about 30 percent from new vehicles, phased in from 2009 to 2016, through a variety of means. The standards must still be approved by USEPA, and face a court challenge.

Implementation Mechanisms

Regulatory program beginning with vehicle model year 2011.

Types(s) of GHG Benefit(s):

CO_2 reductions

Estimated GHG Savings and Costs Per Ton:

	2012	2020	Units
GHG Emission Savings	0.1	1.9	MMtCO2e
Net Present Value (2006-2020)	-$15	-$1,207	$ million
Cumulative Emissions Reductions (2006-2020)	0.1	10.5	MMtCO2e
Cost-Effectiveness	-$179.54	-$114.83	$/tCO2e

- **Data Sources:** CCS, Draft New Mexico Greenhouse Gas Inventory and Reference Case Projections, July 2005; Mary Braun, Tony Dutzik, Jeanne Bassett, A Blueprint For Action: Policy Options to Reduce New Mexico's Contribution to Global Warming, Spring 2006; Elizabeth Ridlington, Tony Dutzik, and Christopher Phelps, Cars and Global Warming: Policy Options to Reduce Connecticut's Global Warming Pollution from Cars and Light Trucks, Spring 2005.

- **Quantification Methods:** The New Mexico PIRG used a model of a light duty vehicle fleet to compare the difference between base case emissions and emissions with fleet penetration over time of vehicles that meet lower GHG emissions standards consistent with California regulations. This model was developed by Elizabeth Ridlington and was used to model emission reductions in Arizona and Connecticut as well as New Mexico. The PIRG model calculated light duty vehicle fuel use and emissions based upon scientifically valid methods. (See discussions in NM PIRG report, pp. 20-22, 49-51 and ConnPIRG report, pp. 27-31.)

  CCS compared the PIRG model results to results for New England states and California that were obtained using comparable modeling methods. CCS found that while all three modeling efforts were scientifically valid and comparable, some of the PIRG model assumptions and methods were relatively conservative, while the California and New England modeling results were relatively optimistic. CCS further refined the PIRG model results consistent with a middle range scenario that produced results less conservative than the PIRG results and less optimistic than the California and New England results. While PIRG projected a 13.7% reduction in light duty vehicle emissions with this policy for Arizona, the CCS refinement estimates a 15.5% reduction in emissions for Arizona. CCS applied this same refined percentage reduction in emissions to the CCAG reference case for New Mexico to obtain a net estimated reduction of 1.9 MMTCO2e in 2020.

- **Key Assumptions:** The three modeling efforts have established a generally acceptable scientific method of projecting GHG emissions reductions from this policy. The CCS comparison of the three modeling methods provides some independent professional validation of the models and their results. The key assumption of the emissions reduction projected by CCS is that the most likely scenario for emissions reductions is one that would fall between the more conservative scenario projected by the AZ PIRG model and the more optimistic scenario projected by the California and the New England models.

Key Uncertainties:

Fleet turnover rates for light duty vehicles and future patterns of consumer purchase choices between passenger cars and light duty trucks (i.e. SUVs).

Contributing Issues

Pending

Feasibility Issues:

Light Duty Vehicle GHG emissions standards can be met with existing 'off-the-shelf' automotive technologies that are already in the marketplace.

Status of Group Approval:

Pending.

Level of Group Support:

Pending.

Barriers to Consensus:

Pending.

TLU-2 Low-Rolling Resistance Tires

Policy Description:

Improve the fuel economy of the light duty vehicle (LDV) fleet by setting minimum energy efficiency standards for replacement tires and requiring that greater information about Low-Rolling Resistance (LRR) replacement tires be made available to consumers at the point of sale.

Policy Design:

- **Goal levels:** Require that replacement tires be LRR tires achieving an average 3% gain in fuel economy.
- **Timing:** The requirement would begin in 2008.
- **Parties:** Industry

Implementation Mechanisms

Manufacturers currently use LRR tires on new vehicles, but they are not easily available to consumers as replacement tires. When installing original equipment tires, carmakers use low rolling resistance tires as a way to contribute to meeting the federal automobile fuel economy (CAFÉ) standards. When replacing the original tires, consumers often purchase less efficient tires. Currently, tire manufacturers and retailers are not required to provide information about the fuel efficiency of replacement tires. In addition, there is no current minimum standard for fuel efficiency that all replacement tires must meet. The rolling resistance of the various tires consumers can purchase have significant variations depending on tread design, composition, cross-section geometry, and inflation pressure.

The program would include consideration of the technical feasibility and cost of such a program, the relationship between tire fuel efficiency and tire safety, potential effects upon tire life, and impacts on the potential for tire recycling. In addition, the program would exempt certain classes of tires that sell in low volumes, including specialty and high performance tires.

An appropriate State agency would initiate a fuel efficient tire replacement program. The program could include consumer education, product labeling, and minimum standards elements. These programs would be developed under a rule development process that would incorporate the best scientific information, including the results from tests of tires conducted by the tire manufacturers, the California Energy Commission, and other data reviewed by the National Academy of Sciences.

The minimum standard is likely to be less stringent than the energy efficiency of original tires provided by the automobile manufacturers on new purchase vehicles. Such a regulation would improve the fuel efficiency of the overall LDV fleet, but not necessarily the fuel efficiency of all tires since consumers would still make choices in the marketplace. The replacement tires in the future would be on average more fuel efficient than those historically purchased, but are likely to be on average not as fuel efficient as the tires included as original equipment by the automobile manufacturers.

Related Policies/Programs in place:

In October of 2003, California adopted the world's first fuel-efficient replacement tire law. AB 844 is a "first-of-its-kind" law requiring energy efficient tires. AB 844 directed the California Energy Commission (CEC) to develop a State Efficient Tire Program. Specifically, AB 844 requires the CEC to: (1) develop a consumer education program, (2) require that retailers provide labeling information to consumers at the point of sale, and (3) promulgate through a rule development process a minimum standard for the fuel efficiency of replacement tires sold. The California rule development process is scheduled to begin in January 2007.

Estimated GHG Savings and Costs Per Ton:

	2012	2020	Units
GHG Emission Savings	IP	0.3	MMtCO2e
Net Present Value (2006-2020)		-$218	$ million
Cumulative Emissions Reductions (2006-2020)		3.5	MMtCO2e
Cost-Effectiveness		-$61.42	$/tCO2e

- **Data Sources:** Studies by National Research Council, California Energy Commission, and Arizona PIRG
- **Quantification Methods:** CCS evaluated and compared a series of existing assessment, as follows:

  At the request of the United States Congress, the National Research Council of the National Academy of Sciences (NRC/NAS) conducted a study of the feasibility of reducing rolling resistance in replacement tires. The 2006 NRC/NAS study made the following conclusions:

  - "Reducing the average rolling resistance of replacement tires by a magnitude of 10 percent is technically and economically feasible.
  - Tires and their rolling resistance characteristics can have a meaningful effect on vehicle fuel economy and consumption.
  - Although traction may be affected by modifying a tire's tread to reduce rolling resistance, the safety consequences are probably undetectable.

- Reducing the average rolling resistance of replacement tires promises fuel savings to consumers that exceed associated tire purchase costs, as long as tire wears life is not shortened."

A 2003 study commissioned by the California Energy Commission found that about 300 million gallons of gasoline per year can be saved in that state with lower rolling resistance tires. A set of four low rolling resistance tires would cost consumers an estimated $5 to $12 more than conventional replacement tires. The efficient tires would reduce gasoline consumption by 1.5 to 4.5 percent, saving the typical driver $50 to $150 over the 50,000-mile life of the tires. Consumers would save more than $470 million annually at current retail prices or approximately $1.4 billion over the three-year lifetime of a typical set of replacement tires.

The New Mexico PIRG report, "A Blueprint for Action," presents estimates for potential carbon dioxide emission reductions from a low-rolling resistance replacement tire program. The AZ PIRG estimate for GHG reductions from a fuel efficient tire program is 0.25 MMTCO2e in 2020.

CCS estimated the reduction in GHG emission from this policy using the Draft New Mexico Greenhouse Gas Inventory and Reference Case as a baseline. Using an emission reduction factor of 2.4%, the resulting CCS estimate for emissions reductions from fuel efficient replacement tires is 0.3 MMtCO2e in 2020. The cumulative emissions reduction for 2008-2020 is 3.5 MMTCO2e.

- **Key Assumptions:** The emissions reductions from LRR replacement tires are the result of gasoline conservation, creating a cost savings for consumers. The present value of the cumulative net benefits to society of an LRR replacement tire program through 2020 is -$61.42 per tCO2e. This cost effectiveness estimate is sensitive to the average price of fuel.

  The estimate of costs associated with LRR replacement tires account for faster tire wear (assuming that tires have lower tread) and an increase in the cost of production that is passed through to consumers. According to the NRC/NAS study, consumers would pay an additional $12.00 per year to replace tires (including installation), and they would pay an additional $1.00 per tire due to increased production costs.

Key Uncertainties

The low rolling resistance fuel efficient tires program is based upon existing off-the-shelf technologies and products that already exist in the consumer marketplace. These tires are already available in the marketplace, and are comparable with the tires included as original equipment on new purchase light duty vehicles.

Contributing Issues

Some reduction in criteria pollutants.

Feasibility Issues

Some members of the group raised questions about potential safety and performance compared to conventional tires.

The 2006 National Academy of Sciences study of LRR replacement tires reported that "the committee could not find safety studies or vehicle crash data that provide insight into the safety impacts associated with large changes in traction capability, much less the smaller changes that may occur from modifying the tread to reduce rolling resistance."

Status of Group Approval:

Pending.

Level of Group Support:

Pending.

Barriers to Consensus:

Pending.

TLU-4 Pay-As-You-Drive Insurance

Policy Description

Pay-As-You-Drive (PAYD) insurance program (changing part of vehicle insurance payments from fixed charges to per-mile charges).

Policy Design

New Mexico would change insurance regulations to allow PAYD insurance, and initiate and promote an aggressive pilot of PAYD in 2008. Assuming this pilot is successful, market penetration could increase to 100% by 2020. This could happen either through competitive pressure (increasing numbers of companies offer it in order to stay competitive) or through a change in state policy mandating PAYD at some point after it has been shown to work.

Pay-as-You-Drive Insurance has been promoted by a variety of groups for reasons that include emissions reduction and safety (through decreased driving), and fairness (by changing insurance costs to more closely track the portion of individuals' risk that is created by miles driven). Some key questions and answers are presented below.

Q: Would PAYD penalize rural residents because they drive further than average?
A: Rates can be set—as most insurance rates are—for classes. PAYD rates would be charged within classes, so that a driver in that class (for example, "rural") traveling the average distance would pay the same under PAYD as before.

Q: Does the technology exist to support PAYD?
A: Yes. The necessary equipment for remote mileage readings is standard on GM OnStar-equipped vehicles. Add-on equipment to relay mileage automatically has been added in several pilot projects for several hundred dollars. All MY1996 vehicles and newer have OBD (on-board diagnostics) that already electronically monitor mileage that can be quickly downloaded via transponder. Also, current odometers are sufficiently tamper-proof to support yearly mileage readings with no additional technology.

Q: Is there any on-the-ground experience with PAYD?
A. Yes. Several companies around the world offer PAYD today. In English-speaking countries:

1) Progressive Insurance ran an initial 5,000-car pilot in Texas, which saw reductions in driving of ~20%. A subsequent pilot in Minnesota filled up its 4,800 spots quickly, and Progressive is now rolling it out in other states. https://tripsense.progressive.com/

2) GMAC Insurance and OnStar have announced a PAYD program.

3) The British insurance company Norwich Union offers PAYD in Britain. (http://www.norwichunion.com/pay-as-you-drive/index.htm).

4) North Central Texas Council of Governments and King County Metro (Seattle) have both recently concluded Requests for Proposals to conduct PAYD pilots (http://www.nctcog.org/trans/air/programs/payd/index.asp). There are no available results as yet.

Any of these pilots could be useful sources of models for a New Mexico pilot project.[1] See also the discussion in the NM PIRG report (pp. 24-26).

Implementation Method(s):

Authorization and pilot project, followed by evaluation and promotion.

Related Policies/Programs in Place:

None cited.

Types(s) of GHG Benefit(s):

CO_2 reductions.

Estimated GHG Savings and Costs Per MMtCO$_2$e:

	2012	2020	Units
GHG Emission Savings	0.15 – 0.63	0.19 – 0.79	MMtCO$_2$e
Net Present Value (2006-2020)		No net cost	$million
Cumulative Emissions Reductions (2006-2020)		In progress	MMtCO$_2$e
Cost-Effectiveness		No net cost	$/tCO$_2$e

Data Sources, Methods, and Assumptions:

[1] For additional information see: Kevin Maney, "For a price, would you let car insurer along for the ride?", *USA Today*, 8/3/05. http://www.usatoday.com/money/industries/technology/maney/2005-08-03-car-monitoring_x.htm ;Todd Litman, "Pay-As-You-Drive Vehicle Insurance: Converting Vehicle Insurance Premiums Into Use-Based Charges" http://www.vtpi.org/tdm/tdm79.htm; Dean Baker, "Insurance By the Mile", *Harper's Magazine*, June, 2006. http://harpers.org/bb-insurance-by-the-mile-2838238.html ; Ian W.H. Parry, "Is Pay-As-You-Drive Insurance: a Better Way to Reduce Gasoline than Gasoline Taxes?," Resources for the Future (www.rff.org/Documents/RFF-DP-05-15.pdf), 2005.

CCS examined an New Mexico (NM) PIRG report and compared its model results for estimated reductions in vehicle miles of travel with other studies of PAYD policies, including those produced by the Economic Policy Institute and Resources for the Future (RFF). NM PIRG conducted an analysis of the potential GHG reductions from a PAYD automobile insurance policy. CCS found that the NM PIRG estimates were comparable with other estimates, which ranged from 8 to 20%. As a result, the NM PIRG results for estimated reductions in vehicle miles of travel and greenhouse gas emissions reductions fell within the lower range of the comparable estimates. That is, the emissions reduction estimates are conservative. (Additional text to be added. Range of GHG tons above captures “allowed” to “required”)

Key Uncertainties:

The specifics of the PAYD insurance programs are to be determined, and the actual effects of PAYD insurance on driver behavior are subject to some significant uncertainty.

Ancillary Benefits and Costs, if applicable:

Reductions in criteria air pollutants, and reductions in crashes.

Feasibility Issues, if applicable:

Some in other states have raised questions and potential concerns regarding disproportionate impacts on rural drivers.

Status of Group Approval:

Pending

Level of Group Support:

Pending.

Barriers to Consensus:

Pending.

TLU-5 Incentive/Disincentive Options Bundle

Policy Description

The four components of this option create financial incentives for the purchase and operation of vehicles that emit lower levels of GHG.

Policy Design

1) A "feebate" program that charges a fee on purchases of relatively high-emitting vehicles and gives a rebate on the purchase of relatively low-emitting vehicles. Overall, fees/rebates are revenue neutral.
2) A change in light-duty vehicle registration fees that increases fees for relatively high-emitting vehicles and reduces fees for relatively low-emitting vehicles. Overall, registration fee revenue would remain the same.
3) A change in new vehicle excise taxes that increases taxes for relatively high-emitting vehicles and reduces taxes for relatively low-emitting vehicles. Overall, excise tax revenue would remain the same.
4) A consumer labeling program that provides buyers with better information on the GHG emissions of new vehicles.

Together, these incentives would change the vehicle fleet technology mix through a combination of demand- and supply-side changes. First, the feebates would directly affect consumer choices for vehicle purchases as a result of the financial incentives. Second, the feebates could indirectly affect the types of vehicles that automobile manufacturers choose to put into the marketplace.

- **Goal levels: IP.**
- **Timing:** Implement all four components beginning calendar year 2008?.
- **Parties:** Industry, NM DMV, NM Department of Taxation and Revenue

Implementation Mechanisms

Existing analysis shows that 90% of the benefits of feebate programs are likely to arise from the manufacturing (supply side) response rather than the consumer (demand side) response. Because individual states such as New Mexico have a small share of the national new vehicle market and thus are unlikely to have a significant influence on the supply side by themselves, states in the southwest have been exploring coordinated multi-state programs. A consistent set of feebate programs across multiple states may include a large enough share of the US market to have a more significant effect on supply side decisions made by automobile manufacturers.

With that in mind, implementation models include:

1. **Feebates** – New Mexico could adopt a feebate similar to that proposed by ACEEE in *Vehicle Efficiency Incentives: An Update on Feebates for States, 9/05 (www.aceee.org/pubs/t051.htm)* See alternative designs and sample feebate structure on pp. 1-5, and note predicted effects of state vs. national programs.

2. **Registration Fees** – This option is modeled after Bill 1038 in North Carolina legislature [Jenkins] (www.ncleg.net/Sessions/2005/Bills/Senate/PDF/S1038v1.pdf) Assess a vehicle registration fee surcharge that equals $1 times miles traveled divided by a factor based on combined EPA Green Vehicle Guide score (www.epa.gov/emissweb/select.htm). The cleanest cars would have factor of 10,000; the worst would have a factor of 1000. For driver with 10,000 annual miles and cleanest car, the surcharge would be: $1 x 10,000/10,000 = $1. The dirtiest car surcharge would be: $1 x 10,000/1,000 = $10. Current New Mexico registration fees for passenger vehicles are based on the weight and year model of the vehicle, and range from $25.50 to $60.50 per year.

3. **Excise Taxes** – This option is modeled after Bill 2438 in the 2005 Massachusetts legislature [Marzelli] (http://www.mass.gov/legis/bills/house/ht02/ht02438.htm). Direct the Secretary of Taxation and Revenue to set a variable excise tax on new passenger vehicles ranging from 0 to 10 percent, based on the vehicle's CO2 emission rate. The tax would be lowest on the lowest emitting vehicles and highest on the highest emitting vehicles, subject to certain guidelines and constrained by maintaining the current average excise tax of 3 percent (an annual adjustment of the schedule of taxes would maintain this average). The excise tax could be set at zero for vehicles that comply with the European Union GHG standards (for discussion of EU standards, see *Pew Center*, *Comparison of Passenger Vehicle Fuel Economy & GHG Emission Standards Around the World, 12/04 (*http://www.pewclimate.org/global-warming-in-depth/all_reports/fuel_economy/index.cfm, pp. 11-12. New Mexico currently has a zero excise tax for hybrid cars.

4. **Labeling Program** - This option is modeled after an EU program begun in 2001, and a recent proposal by a researcher at Resources for the Future (http://www.rff.org/rff/News/Features/Combating-Global-Warming-One-Car-at-a-Time.cfm). Require dealers to place a GHG label on each new vehicle that includes the estimated amount of CO2 (in pounds) produced annually and places the vehicle into one of five distinct groupings from "best" to "worst."

Relateed Policies/Programs In Place

While feebate proposals have been described in academic studies, there has been no implementation of a full feebate program in the United States. While there are individual 'gas guzzler tax' and tax incentives for hybrid vehicle purchases, there is not yet any history of an on-the-ground example of a comprehensively implemented feebate program.

Types(s) of GHG Benefit(s):

All GHG exhaust emissions through reduced fuel consumption.

Estimated GHG Savings and Costs Per Ton:

	2012	2020	Units
GHG Emission Savings	0.1	0.1	MMtCO2e
Net Present Value (2006-2020)			$ million
Cumulative Emissions Reductions (2006-2020)			MMtCO2e
Cost-Effectiveness			$/tCO2e

- Data Sources: TBD
- Quantification Methods: TBD
- Key Assumptions: TBD

Key Uncertainties

Both the United States Department of Energy and the Canadian Transport Ministry have studied the potential impacts of national level feebate programs in recent years. While these studies have informed the debate about the advantages and disadvantages of national feebate programs, there remains considerable uncertainty about the potential benefits and costs of state or multi-state level feebate programs. There is an important need for a greater understanding of the potential effects of single state or multi-state feebate programs on the types of vehicles that manufacturers put into the marketplace.

Contributing Issues

TBD

Feasibility Issues:

TBD

Status of Group Approval:

Pending.

Level of Group Support:

Pending.

Barriers to Consensus:

Pending.

TLU – 6a, Alternative Fuels Use

Policy Description

Expand the availability and use of alternative fuels for transportation in New Mexico. This should include biodiesel, ethanol, electricity, and renewable hydrogen fuels. Also, expand the use of zero emission vehicles for transportation in New Mexico. Such vehicles would primarily utilize electricity and hydrogen made from verifiable renewable resources (i.e., solar, wind, and biomass generation). Plug-in electric vehicles equipped with batteries would also serve as storage capacity for wind and solar power through grid interconnection (V2G).

Policy Design

The goals for this policy should be phased in to utilize biofuels to replace the specified percentages of gasoline and diesel consumed for transportation throughout New Mexico by the specified year, as shown under Goal Levels, below. The policy also includes VMT targets for zero emission vehicles and the implementation of a New Mexico "Multi-Fuel Corridor," composed of a full range of alternative energy refueling options located every 120 miles on New Mexico's highways.

These goals of this policy would be achieved through a combination of mandates for state government fleets, financial incentives, outreach, and market-based mechanisms.

- **Goals:**

The goal levels for biofuels are shown in the following table:

Phase	Percentage of Gasoline to be Replaced by Biofuels	Percentage of Diesel to be Replaced by Biofuels	Year
1	10%	2%	2009
2	20%	20%	2012
3	30%	30%	2030
4	40%	40%	2040

The goals for zero emission vehicles are as follows:

-Replace 10% of VMT from light-duty vehicles in New Mexico with zero emission vehicles, hybrids, or partial ZEVs by 2010;

-replace 20% of VMT from light-duty vehicles with zero emission vehicles, hybrids, or partial ZEVs by 2015; and

-replace 40% of VMT from light-duty vehicles with zero emission vehicles by 2040.

The goals for implementing a New Mexico "Multi-Fuel Corridor" are as follows:

-8 stations located along I-25 and I-40 by 2010,

-15 additional stations installed along major non-interstate roads by 2015; and

-15 additional stations along other NM highways by 2020.

- **Timing:** See goals.
- **Coverage of parties:** State of New Mexico, fuel retailers, fuel wholesalers, business owners, car dealers, biofuels producers, and alternative vehicle advocates and private vehicle owners.
- **Other:** N/A.

Implementation Mechanisms

Information and education: Use information and education outreach to focus on voluntary methods of alternative fuel expansion and on incentives and cost benefits of zero emission vehicle acquisition. In addition, include mandated policy mechanisms.

Technical assistance: Provide technical assistance through vehicle dealers, consumer technical support groups and public demonstrations

Funding mechanisms and or incentives: Pursue DOE and State funding for more alternative fuel pumps throughout the State and for introducing appropriate infrastructure throughout the State. Existing multifuel pump in Santa Fe provides model for dispensing three alternative fuels: B20 biodiesel, E85 ethanol, and E10. Create additional fuels options for electric and hydrogen –fuels vehicles.

Codes and standards: This measure should include a mandated Renewable Fuel Standard (RFS), corresponding to the penetration rates listed above. The RFS should include a cost trigger, so that if the cost of alternative fuels exceeds conventional fuels by more than a specified amount, the RFS would be temporarily removed. The cost trigger should be based on costs over a period of time, and not spot prices. Charles will send information on a RFS bill that he is currently helping with. Additionally, production issues should be included in the trigger, such as water use in growing corn (or other crops) for the biofuels, such that the production of the biofuels does not increase GHG emissions or cause other resource problems.

Voluntary and or negotiated agreements: Provide financial incentives for alternative fuels distributors and producers: Provide state funds and/or loan guarantees for construction of alternative fuels production and distribution facilities. Also, provide grow receipts tax exemptions, production tax credits and reduction in excise taxes on alt fuel sales.

Market based mechanisms: Provide payment structure for electric vehicle owners to sell stored power back to grid when needed (V2G).

Pilots and demos: Show example of existing multifuel pumps in Santa Fe which provides a model for dispensing three alternative fuels: B20 biodiesel, E85 ethanol and E10. Provide demonstrations of ZEVs charging, fueling and operating in New Mexico

Research and development: Pursue in-state biofuels production from a variety of sources. Analyze and quantify range of cost and health benefits that accrue to alt fuels vehicle owners.

Related Policies/Programs in Place

Pending

Types(s) of GHG Reductions

CO2 emissions are reduced by offsetting the use of petroleum-derived gasoline and diesel. ZEVs will also reduce N2O, CH4, and criteria and toxic pollutant emissions.

Estimated GHG Savings and Costs per MTCO2e

	2012	2020	Units
GHG Emission Savings	2.1	4.7	MMtCO2e
Net Present Value (2006-2020)		Zero net cost	$million
Cumulative Emissions Reductions (2006-2020)		35.8	MMtCO2e
Cost-Effectiveness		Zero net cost	$/tCO2e

- **Data Sources:**

  Environmental, Economic, and Energetic Costs and Benefits of Biodiesel and Ethanol Biofuels, Jason Hill, et. al., University of Minnesota, published in Proceedings of the National Academy of Sciences of the United States of America, volume 103, no. 30, July 25, 2006.

Well-to-Wheels Analysis of Advanced Fuel/Vehicle Systems— A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions, General Motors, Argonne National Lab, and Air Improvement Resource, Inc., May 2005.

"Documentation of Inputs to Macroeconomic Assessment of the Climate Action Team Report to the Governor and Legislature," California Climate Action Team, January 2006.

- **Quantification Methods:** Well-to-wheels CO2e emission factors from a recent Argonne National Laboratory Study were used to estimate the benefits of offsetting conventional gasoline with starch-based ethanol and cellulosic ethanol for the amount of production needed to fulfill the policy goals. Well-to-wheels emission factors take into account the energy required to produce, process, and transport each fuel type (i.e., starting with the oil well for gasoline and the crop for starch-based ethanol).

  The quantity of diesel fuel projected to be replaced in New Mexico with biodiesel were estimated based on the penetration rates of the above goals. A reduction in CO2 emissions of 41% will be applied to the quantity of diesel fuel replaced by biodiesel. (Hill, et al, July 2006).

  For zero-emission vehicles, the amount of VMT from conventional vehicles replaced by VMT from zero emission vehicles was converted to the corresponding amount of fuel consumed. A 100% reduction was applied to the CO2 emissions corresponding to the shift from conventional vehicles to zero-emission vehicles, assuming the zero-emission vehicles are powered by a clean fuel source. Full ZEVs were assumed to be phased in over time. Thus, from 2010 to 2012, the 10% VMT target for ZEVs was assumed to be met by vehicles running on electric or clean power 40% of the time. From 2013 to 2014, this percentage was increased to 60 percent of the time and from 2015 through 2017, it was increased to 80%. Starting in 2018, it was assumed that 100% of the ZEV target was met with 100% electric or clean fuel vehicles.

- **Key Assumptions:** See above.

Key Uncertainties

Ability of ZEVs to meet market penetration goals.

Contributing Issues

EPA has reported that the use of B20 biodiesel can lead to a 21% reduction in HC, 11% reduction in CO, and a 10% reduction in PM. Toxic emission reductions can also be significant. However, biodiesel can lead to increased exhaust emissions of NOx and some air toxics, depending on feedstock and blend level. EPA reports a 2% increase in NOx emissions for B20 blends. Effects on newer diesel vehicles are likely to be different.

An increased penetration of biofuels and ZEVs reduces our foreign fossil fuel dependency.

Feasibility Issues

Pending

Status of Group Approval

Pending

Level of Group Support

Pending

Barriers to Consensus

Pending

TLU – 6b, Alternative Fuels Production

Policy Description

Increase production of ethanol from starch and cellulosic-based feedstocks and build appropriate production capacity for biodiesel and renewables-generated electricity and hydrogen fuels for transportation purposes.

The proposed policy action is to provide incentives for the production of various carbon-neutral or zero carbon fuels. These would include ethanol produced from crops (starch based) and agricultural and municipal waste (cellulose based). Use of the ethanol will offset fossil fuel use (gasoline) and will provide a new market for corn and other grains as well as forest and municipal solid wastes. Also, incentives would be provided to build substantial biodiesel, renewably-generated electricity and hydrogen production capacity.

Policy Design

Measured increases in the production of corn, sorghum, switch grass and vegetable oil crops such as canola, peanut, sunflower jojoba, mustard, etc) should be achievable and will provide a diversity of starch and oil-based biofuels production New Mexico. However, any increase in crops grown for energy production must be balanced by considerations of demand on water resources and input of petroleum chemical based products (fertilizers, herbicides, pesticides) needed to increase crop production in addition to increased biofuels processing capacity.

Goals: Proposed amount of ethanol produced from starch conversion by 2012 is at least 60 million gallons. This will require doubling current capacity for starch conversion at the single plant in New Mexico. Production should be up to 50 million gallons by 2010 and in excess of 150 million gallons by 2020.

The proposed amount of ethanol produced from cellulose conversion is 50 million gallons by 2015. Due to needed research and development at a national scale, production of ethanol will ramp up slowly until 2010 and will be 1 million gallons by 2010. Accelerated ramp up will boost production to 70 million gallons by 2015 and over 100 million gallons by 2020. Amounts proposed for 2050 are 150 million gallons.

The proposed ramp up for biodiesel is one-third the amount of ethanol.

Home electric charging is already technically feasible. Public recharging facilities would be made available as population of electric vehicles increases.

Home hydrogen appliances and hydrogen fueling stations would be encouraged through market and financial incentives as population of hydrogen vehicles increases.

- **Timing:** See above.
- **Coverage of parties:** New Mexico Department of Agriculture (NMDA), New Mexico Agricultural Extension Services (NMAES), and New Mexico Energy, Minerals, and Natural Resources Department (NMEMND, biofuels producers and electric utilities.
- **Other:** N/A

Implementation Mechanisms

Information and education: NMDA and NMAES would develop guidance for grain growers to convert current crops to biofuels-compatible crops and practices to grow these crops. NM Energy, Minerals, and Natural Resources would provide guidance on biofuels, electricity and hydrogen production and use in the state and nation.

Technical assistance: Technical assistance will be required but should be available from programs named in the Energy Policy Act of 2005.

Funding mechanisms and or incentives: Expect private investment (e.g., Abengoa and others) and federal and state tax incentives to produce biofuels from cellulose and starch crops and energy investors in power and hydrogen production.

Market based mechanisms: Expect increased biofuels production to increase demand for starch-based crops (corn, sorghum, soybeans) and cellulose-based feedstock such as agricultural and municipal waste.

Provide payment structure for electric vehicle owners to sell stored power back to grid when needed (V2G). Provide special dedicated roads, preferential road access and parking benefits for NZEVs.

Pilots and demos: Demonstration projects featuring cellulosic-based feedstocks used for ethanol production would be useful to test economics of cellulosic ethanol production. Demonstrations of locally-produced alternative fuels e.g. biodiesel, solar power and hydrogen for local use would help spur rapid public acceptance of the technologies. Pilot for cellulose conversion to ethanol needed to show that technology works and can be implemented. .

Research and development: As above, research on cellulose conversion to ethanol and production of renewable electricity and hydrogen will be required in order to implement cost effective process.

Related Policies/Programs in Place

Pending

Types(s) of GHG Reductions

CO_2 emissions are reduced by offsetting the use of petroleum-derived gasoline and diesel. In order to assess the CO_2 benefit, energy requirements of producing biofuels from starch and cellulose need to be compared to the energy requirements of producing gasoline and diesel from crude oil and tar sands. CO_2 savings from electric and hydrogen fueled vehicles need also to be quantified.

Electric Vehicle Research: In Arizona where 67 percent of power plants are coal-fired, a study concluded that electric vehicles would reduce greenhouse gases such as CO_2 by 71 percent. Likewise, a study conducted by the Union of Concerned Scientists found that electric vehicles in the Northeast would reduce CO emissions by 99.8 percent, volatile organic compounds by 90 percent, NO_x by 80 percent, and CO_2 by as much as 60 percent.

According to the Calif Air Resources Board, electric vehicles in the LA Basin produce 98% fewer hydrocarbons, 89% fewer oxides of nitrogen, and 99% less carbon monoxide than gasoline vehicles when power plant emissions are taken into account. The LA Dept of Water and Power has determined that electricity generation sufficient to power 100,000 miles of EV driving produces less than 100 pounds of pollutants compared to 3,000 pounds produced by gasoline vehicles.

Estimated GHG Savings and Costs per MTCO2e

Quantification of reductions and costs to are presented in TLU-6a.

- **Data Sources:** See TLU-6a.
- **Quantification Methods:** See TLU-6a.
- **Key Assumptions:**

Monitor grain crop production and conversion to biofuels, compare against state and federal guidelines on ethanol production.

Monitor agricultural wastes available and actually used to produced ethanol.

Sufficient research and development will be completed and implemented for efficient cellulose conversion to ethanol by 2010.

Increased production of crops will result in increased income for New Mexico farmers.

Increased energy crop production will not negatively impact water, land resources and will not result in net increase of petroleum products used to provide the offset.

Key Uncertainties

Offsetting petroleum-based gasoline and diesel fuel with biofuels carries the uncertainty that such is sustainable. Another uncertainty is increasing biofuels production capacity to meet the expected increase in demand. Conversion of cellulose to ethanol depends heavily on development of new technology for the conversion. Without improved efficiency and cost-effectiveness of the conversion process, production of ethanol from cellulose will lag behind the accelerating demand.

The main uncertainty related to costs is in the development of biofuels and renewable-based electricity and hydrogen fuels at a price that is competitive to petroleum products and affordable to the public and business community.

Contributing Issues

Benefits include increased production of energy crops and transportation-oriented energy on New Mexico land and creation of new jobs for local workers as production and demand for energy increases.

Feasibility Issues

Pending

Status of Group Approval

Pending

Level of Group Support

Pending

Barriers to Consensus

Pending

Transportation and Land Use Technical Work Group
Quantification of Group of VMT Reduction Options

CCS recommends that the GHG impacts of Options 7 through 12 be quantified as a group. These policy options are currently distinct because they work on different parts of the transportation-land use system, but they all reduce vehicle-miles-traveled (VMT). The policy designs proposed under each TLU policy option are for the most part distinct. There is some apparent overlap because the same policy tools can be applied in different places and in different ways. However, while the policy tools can be applied individually, they are mutually supportive and in many cases interdependent. Transit-oriented Development (TLU-8) requires transit (TLU-10). Quantification of the GHG impacts of this group of policy options is easier, and the results more robust, if the options are "bundled together". The quantification of costs is still in progress. The detailed policy descriptions are presented below.

The literature on these strategies suggest that they can result in a range of reduction in vehicle-miles-traveled (VMT) of 2%-11%, on a statewide basis. Assuming aggressive implementation, CCS has applied the upper end of this range (11%) to New Mexico's projected VMT (per the GHG Inventory and Reference Case Projections prepared for the CCAG) results in the GHG savings in the table below for 2012, 2020, and cumulative for 2007-2020. The first year of impact was assumed to be 2010.

Estimated GHG Savings and Costs Per Ton:

	2012	**2020**	**Cumulative 2007-2020**	**Units**
GHG Emission Savings	1.16	1.34	13.51	MMtCO2e
Net Present Value (2007-2020)			In progress	$ million
Cost-Effectiveness			In progress	$/tCO2e

Policy descriptions for TLU 7 to 12 follow below.

TLU-7 Infill, Brownfield Re-development

Policy Description

Reuse land already developed but is now vacant, underused, or even mildly polluted. Meet the growing demand by a larger number of households comprised of singles, working parents and single parents seeking housing located close to services, jobs and transit. Reduce emissions by reducing both number of automobile trips per household as well as their length.

Policy Design

Implementation level(s) beyond baseline: Use fiscal, tax and other financing mechanisms to remove barriers to / support recycling of existing buildings and underused land, and to give infill and brownfield sites priority for development over sprawling sites at the edges of communities.

Implementation Mechanisms

Information and education: Require all municipalities to engage in a visioning process, often done through comprehensive planning, to agree on long-range goals and a vision for itself. Goals might include addressing housing shortages, adding open space and parks, or kick starting economic development in overlooked areas of town. Require that infill/brownfield redevelopment be considered first to absorb growth.

Educate about the public benefits of infill and brownfield redevelopment.

Technical assistance: Target and map potential sites and districts where infill/brownfield cleanup is needed or appropriate, and set quantifiable goals for the number of units desired for target areas. Those areas can then be rezoned for residential or light commercial uses that are compatible with residential infill.

Local governments (with state support) can prepare codes for required performance (in energy, accessibility, parking, etc.) but allow for more flexibility in methods of achieving that performance. In addition, government can streamline entitlement/permit processes for smaller projects.

NM Environment Department has a "Targeted Brownfields Assessment Program; see www.lgd.state.nm.us/PLAN/PDF/ENV2.PDF

Support community land trusts, such as Albuquerque's Sawmill Land Trust or a local government such as Santa Fe's city program, to purchase empty land and establish equity controls.

Funding mechanisms and or incentives: The state works with MPOs and local jurisdictions to establish and fund (where necessary) local infill and Brownfields recycling programs, including, for example:

- Location efficient mortgage programs recognize that infill housing allows consumers to choose more efficient transportation options, increasing their house purchasing power.
- Tax increment financing: a city-designated and voter-approved redevelopment district sets up a TIF district to finance improvements to public space. Debt is repaid over a 20-year period from the increment of new property and gross receipts taxes from private development in the district.
- Development (or impact) fees can be set to strongly encourage infill and discourage sprawl, by making the differential fees for infill development drastically less. For instance, Albuquerque through its Planned Growth Strategy has established a variable rate impact fee system. Projects located within the close-in areas pay a minimal percentage of total fees, while projects near the edge of the urbanized area pay maximum fees. This fee reduction helps level the playing field between infill and outer-edge sprawl sites.
- Other funding mechanisms and incentives include:
    - Offer Predevelopment grants and loans to explore project feasibility on tough sites;
    - Assist with land acquisition and assemblage, write-downs and loans;
    - Advance loans against committed, but not funded, equity or debt

Codes and standards: State supports development of local urban design codes, tied to the local government's comprehensive plan.

Market based mechanisms: Offer a variety of developer incentives and disincentives to encourage infill and brownfield redevelopment, such as fee waivers, fast track planning, exactions, and no or low impact fees. Construct infill liner buildings to obscure off street parking lots, while waiving off street parking requirements.

Pilots and demos: Offer incentives to reduce traffic congestion and parking demand, such as Commuter Benefits (pre-tax and employer-paid transit passes), live-where-you-work home mortgages, location efficient mortgage, cash-out parking, and complete shower facilities for bicyclists

Reserve five percent of a city's capital improvement program pay for needed upgrades and repairs to sidewalks, so that existing and new residents and employees can easily navigate neighborhoods and downtown by foot.

Related Policies/Programs in Place

Pending

Types(s) of GHG Reductions

All GHG exhaust emissions through reduced fuel consumption.

Estimated GHG Savings and Costs per MTCO2e

See previous discussion above on “quantification of group VMT reduction options”

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Key Uncertainties

Pending

Contributing Issues

Pending

Feasibility Issues

Pending

Status of Group Approval

Pending

Level of Group Support

(Unanimous Consent, Supermajority, Majority, or Minority)

Barriers to Consensus

Pending

TLU-8 Transit-Oriented Development

Policy Description

Support shifts to lower emitting mode choices by building compact development around transit stops to meet daily needs by foot, bicycle, or transit and/or by clustering employment centers around transit stops. TOD requires transit; this option is ideally paired with TLU-10, Multi-modal Transportation Bundle.

Policy Design

Continue to implement, and expand, the TOD-supportive policies in recommended by The Report of the Governor's Task Force on Our Communities, Our Future:[2]

1) **Tax Increment Financing (TIF) Districts.** The state holds the key to implementation of TIF programs through the extension of its credit resources.
2) **State Funding Programs.** Provide state funds for affordable housing and parks, both of which help make TODs successful.
3) **Support of Local Governments.** Amend local government enabling laws to give local governments modern, effective tools they need to make their communities better, more resource-efficient, and more livable.
4) **Location of State Facilities.** Locate state facilities near transit facilities.
5) **State Targeting of Infrastructure Investments.** Legislatively appropriated capital outlay funds, the State Public Project Revolving Loan Fund, and other state-funded infrastructure initiatives should be used for projects that encourage walkable and traditional communities, and are supportive of transit.

These goals from the Governor's Report can be further developed to become implementable. For example: State and municipalities establish priority funding areas to target state and local public funds to TOD districts as appropriate for growth. Redirect at least [25] percent of new housing and other development assistance to TOD districts.

- **Goals:** Pending.
- **Timing:** There are no barriers to beginning to implement each of these recommendations immediately. [Add update on status of the "Livability Grants for Communities, Regions, and the State" and other recommendations in the Governor's report]
- **Parties:** State [add lead agencies], MPOs, local jurisdictions

[2] "Livability! The Report of the Governor's Task Force on Our Communities, Our Future", January, 2005. http://www.state.nm.us/clients/dfa/Files/LGD/PLAN/PDF/livability.PDF.

Implementation Mechanisms

Pending

Related Policies/Programs in Place

"What makes TODs relevant now is that New Mexico is embarking on one of the most exciting and extensive transportation revolutions in its history. The Governor's commuter rail project soon will be running through downtown Albuquerque between Belen and Bernalillo in its first phase, and continuing on to Santa Fe in its second phase.

"In addition, the City of Albuquerque recently started a rapid transit bus system, going east and west on Central through the city. The intersection of First and Central in downtown Albuquerque will be the best-served transit location in New Mexico by the end of 2005 when the commuter train starts rolling.

"There are numerous opportunities for TODs in New Mexico, including a number that are being started now before the commuter rail system is operational." [3]

[Add update on status of the "Livability Grants for Communities, Regions, and the State" and other recommendations in the Governor's report]

Types(s) of GHG Reductions

All GHG exhaust emissions through reduced fuel consumption. Additional benefits from reduced building energy use, from more compact development.

Estimated GHG Savings and Costs per MTCO2e

See previous discussion above on "quantification of group VMT reduction options"

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Key Uncertainties

Pending

Contributing Issues

Pending

Feasibility Issues

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[3] "Livability! The Report of the Governor's Task Force on Our Communities, Our Future", January, 2005, p. 16. http://www.state.nm.us/clients/dfa/Files/LGD/PLAN/PDF/livability.PDF.

Pending

Status of Group Approval

Pending

Level of Group Support

(Unanimous Consent, Supermajority, Majority, or Minority)

Barriers to Consensus

Pending

TLU-9 Smart Growth Planning, Modeling, Tools

Policy Description

The components of this option are some of the most effective policies promoting Smart Growth. These policies reduce GHG emissions by shifting development patterns and reducing vehicle trips and total vehicle miles traveled.

Policy Design

- **Goals:** Pending
- **Timing:** Pending
- **Coverage of Parties:** Pending

Implementation Mechanisms

1) Inform and educate developers on the state's building code for the rehab of older buildings (New Mexico adopted an international rehabilitation code).
2) Make maintenance of infrastructure a priority (Fix it First). Revise any state infrastructure programs (transportation, water, sewer) that fund new systems but not maintenance or upgrades for existing systems.
3) Replace "average cost pricing" for utility services with rate structures that charge full marginal costs for both new infrastructure and for roads, water, sewer, electricity, and telephone service delivery.
4) Use the broad set of state discretionary funding to reward localities that plan, zone and build for higher density development
5) Establish regional service agreements that assign responsibility to a single regional agency for major public services (transportation, water, sewers) in ways that reduce costs, improve intergovernmental coordination and support Smart Growth.
6) Require municipalities to designate areas for development where public infrastructure will be provided, and limit development outside these areas or requiring developers to pay the incremental costs for infrastructure in non-designated areas.
7) Encourage and/or incentivize localities to adopt zoning practices, such as Form Based Codes (FBC), that result in compact mixed-use, walkable communities.
8) Abolish or reduce minimum parking requirements in zoning codes, and allow localities to establish parking maximums.
9) Reduce or eliminate acreage standards for K – 12 schools

[Note: Some are similar to policy design elements in TLU-6, TOD, but would be applied more broadly in this TLU option.]

Related Policies/Programs in Place

[add update on status of the "Livability Grants for Communities, Regions, and the State" recommended by the Governor's report]

Types(s) of GHG Reductions

All GHG exhaust emissions through reduced fuel consumption.

Estimated GHG Savings and Costs per MTCO2e

See previous discussion above on "quantification of group VMT reduction options"

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Key Uncertainties

Pending

Contributing Issues

Pending

Feasibility Issues

Pending

Status of Group Approval

Pending

Level of Group Support

(Unanimous Consent, Supermajority, Majority, or Minority)

Barriers to Consensus

Pending

TLU-10 Multimodal Transportation Bundle

Policy Description

The New Mexico 2025 Statewide Multimodal Transportation Plan establishes objectives and implementation strategies that aim to shift the State's focus from roads to an integrated, multimodal system. This option lays out several key actions required to realize the potential for GHG reductions implicit in the State's plan and that further promote a multimodal transportation systems.

Support shifts in passenger transportation mode choice (auto, bus, rail, bike, pedestrian, etc.) to lower emitting choices, and ensure that transportation serves smart growth development (see TLUs-7, 8, and 9).

Policy Design

Includes:

1) Make GHG-optimal use of CMAQ funds;
2) Expand transit infrastructure (rail, bus, BRT);
3) Improve existing transit service,
4) Improve transit promotion and marketing (including tax-free and employer-paid Commuter Benefits, and Parking Cash Out);
5) Improve bike and pedestrian infrastructure;
6) Explore additional commuter rail using existing rail corridors;
7) Review all proposed transportation projects for multi-modal flexibility (e.g., add or reserve room for BRT or light rail if feasible);
8) Conduct research into new transportation technologies and urban planning techniques.

- **Goals:** Pending
- **Timing:** There are no barriers to beginning to implement each of these recommendations pre-2010.
- **Parties:** Department of Transportation, Regional Transportation Districts, Metropolitan Planning Organizations, Regional Planning Organizations, municipalties.

Implementation Mechanisms

Information and education: Expand the State's use of Intelligent Transportation Systems *(2025 Plan, p. 21)*

Technical assistance: Provide ample technical assistance to MPOs, RPOs, and RTDs for implementation of all aspects of the plan, including application of site assessment tools identifying multimodal needs and opportunities within the Strategic Transportation Corridors identified in the plan. *(2025 Plan, p. 14)*

Promote transportation performance measures that explicitly balance mobility and access. Discourage measures based solely on speed-based level of service. *(not explict in plan, but balance of mobility and access results in less sprawl and VMT)*

Funding mechanisms and or incentives:

1) **RTDs –** Aggressively support and aid the creation of Regional Transportation Districts (RTDs). New Mexico has authorized created of RTDs that are a critical means of expanding mass transit. RTDs can sell bonds for capital projects, and member governments can levy taxes for operation and maintenance (subject to voter approval). *(2025 Plan, p. 9, 37)*
2) **Expand Rail Service –** secure funding for rail passenger service to central New Mexico (within Albuquerque metro area and between it and Santa Fe) by the end of 2008. *(2025 Plan, p. 9)*
3) **Non-Motorized Facilities** - Improve and expand transportation facilities with pedestrian, bicycle, and transit-oriented features. *(2025 Plan, p. 9)*
4) **Mode Shift –** Integrate needs analysis, planning, and funding to promote the shift of long distance freight from roads to rail or airfreight, including rail initiatives in Governor Richardson's Investment Partnership (GRIP) *(2025 Plan, p. 9, 15)*

Related Policies/Programs in Place

Pending

Types(s) of GHG Reductions

All GHG exhaust emissions through reduced fuel consumption.

Estimated GHG Savings and Costs per MTCO2e

See previous discussion above on "quantification of group VMT reduction options"

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Key Uncertainties

Pending

Contributing Issues

Pending

Feasibility Issues

Pending

Status of Group Approval

Pending

Level of Group Support

(Unanimous Consent, Supermajority, Majority, or Minority)

Barriers to Consensus

Pending

TLU – 13, Diesel Retrofits

Policy Description

Apply diesel retrofit controls to or retire diesel engines with relatively high emission rates.

Policy Design

This program would focus on applying diesel retrofit control devices or retiring heavy-duty diesel engines from small owners/operators. Financial incentives and small business assistance would be used to assist small owners/operators to apply for grants or loans available for this purpose. The focus is on engines that will continue to be in use for a number of additional years. This measure could also include the conversion of older diesel engines to run on biodiesel fuel.

- **Goals:** Retrofit, retire, or convert to biodiesel fuel 25% of heavy-duty diesel engines with at least 4 years of remaining vehicle life through model year 2006 by 2010.
- **Timing:** See goals.
- **Coverage of parties:** Industry, NMED, independent and small truck owners/operators.
- **Other:** N/A

Implementation Mechanisms

Information and education: An information and education component will be needed to provide truck and bus owners, school districts, and municipal organizations with information regarding the significant GHG black carbon emission reductions that could be achieved by retrofitting or retiring certain truck or bus engines with high annual emissions and replacing them with vehicles meeting the new emission standards. Provide information on potential funding partners, grants, or loans available from a number of organizations for this purpose.

Funding mechanisms or incentives: Develop a loan or grant program allow small truck owners to accelerate new vehicle purchases or to apply retrofit technologies to their fleets.

Related Policies/Programs in Place

Pending

Types(s) of GHG Reductions

This program will reduce black carbon emissions.

Estimated GHG Savings and Costs per MTCO2e

	2012	2020	Units
GHG Emission Savings	0.041	0.003	MMtCO2e
Net Present Value (2006-2020)		*In progress*	$million
Cumulative Emissions Reductions (2006-2020)		0.331	MMtCO2e
Cost-Effectiveness		*In progress*	$/tCO2e

Note that reductions in 2020 are lower than reductions in 2012 due to natural fleet turnover (e.g., fewer vehicles in fleet not meeting the 2007 emission standards by 2020).

- **Data Sources:**

  "Diesel Retrofit Technology and Program Experience," prepared for USEPA by Emissions Advantage, LLC, July 29, 2005.

  "Texas Emission Reduction Plan Assessment in the Dallas Fort-Worth Area, Final Report," ENVIRON International Corporation, prepared for Houston Advanced Research Center, November 12, 2004.

  Data from EPA's MOBILE6.2 model to estimate the mix of Class 8 HDDV VMT, PM10 emissions, and number of vehicles by model year.

  "RIA Local Mobile Measures Methodology," EPA memo on the estimation of potential local control measures, May 2006.

  Data from USDOE/EIA *Annual Energy Outlook 2005* to estimate the amount of fuel consumed annually per truck.

  Information from California's Carl Moyer program

  - **Quantification Methods:** The 2002 PM10 emission estimates prepared for New Mexico in EPA's Final 2002 NEI were used as the baseline emissions. These were scaled by New Mexico diesel fuel use and MOBILE6 fleet average PM10 exhaust emission rates to 2010, 2012, and 2020 to estimate 2010 and 2020 statewide

PM10 emissions from Class 5-8 HDDVs and diesel buses. Data from EPA's MOBILE6 emission factor model were used to estimate the mix of vehicles types and ages in the fleet. The mix of model years expected to be candidates for this measure (1990 through 2006 model years) and reductions from replacing engines with new 2007 model year engines or retrofitting with diesel particulate filters were based on EPA's assumptions by model year (EPA, 2006), providing a 90 to 98% PM reduction. PM10 exhaust emission reductions were then converted to black carbon and CO_2 equivalent emission reductions.

- **Key Assumptions:** A replacement/retrofit rate of 25% of vehicles from eligible model years. It is assumed that retired vehicles are replaced by those meeting the 2007 emission standards.

Key Uncertainties

Actual attainable replacement/retrofit rates.

Contributing Issues

A diesel retrofit/replacement program will also reduce emissions of PM, NOx, and toxics.

Feasibility Issues

Pending

Status of Group Approval

Pending

Level of Group Support

Pending

Barriers to Consensus

Pending

TLU – 14, Truck Stop Electrification/Anti-Idling

Policy Description

Reduce idling from diesel and gasoline heavy-duty vehicles, buses, and other vehicles through the combination of a Statewide anti-idling ordinance and by promoting and expanding the use of technologies that reduce long-term heavy-duty vehicle idling, with an emphasis on encouraging the use of innovative truck stop electrification. Anti-idling control measures reduce fuel consumption and emissions from stationary freight vehicles (potentially wasted energy). In addition to truck stop electrification, other available technologies that reduce heavy-duty vehicle idling include automatic engine shut down/start up system controls; direct fired heaters (for providing heat only); and auxiliary power units.

Policy Design

Develop and implement a statewide ordinance banning idling by heavy-duty vehicles in most situations. The ordinance should be designed to be easily enforceable by the appropriate state and local agencies. It is critical that a dedicated state funding stream for enforcement be identified for this measure to be successful in reducing vehicle idling and the resulting reductions in GHG emissions. The ordinance would also need to limit exemptions as much as possible, to make it easier to enforce. However, idling that occurs for public health and safety reasons (such as emergency vehicles) should be exempted from this rule.

Set up truck stop electrification stations at key truck stops and truck rest areas along the major highways in New Mexico. Electricity for powering these stations should come from clean sources, such as solar panels that would cover the trucks and also provide shade. Require truck stops to purchase renewable energy certificates. Coordinate this measure with Arizona and other neighboring States.

- **Goals:** Reduce fuel consumption from idling of heavy-duty diesel vehicles by 80% by year 2010, and by 100% by 2020.
- **Timing:** Have ordinance in place by 2008.
- **Coverage of parties:** Industry, NMED, Counties, truck stop owners.
- **Other:** N/A

Implementation Mechanisms

Information and education: Provide information to fleet carriers, shippers, retailers, bus companies, school districts, and others involved in the diesel fleet industry indicating the economic benefits, as well as the environmental benefits, of reducing or eliminating idling. Emphasize the fuel savings benefits, reductions in toxic emissions, and reduced engine wear associated with reducing idling. Also, identifying best practices within the industry and recognizing companies with these best practices in place within New Mexico should be used to encourage companies to select these carriers for their shipments. Develop outreach materials with cost benefits information and toxic diesel health impacts. Outreach materials should also be geared toward making the general public aware of the GHG, toxics, and fuel-saving benefits of eliminating idling on personal vehicles, as well as on trucks and buses.

Technical assistance: Coordinate with anti-idling product manufacturers to organize workshops/outreach programs to regulated community to let them know of technological options that provide alternatives to the need for idling including products for cabin comfort, power for other functions (e.g., refrigerated trucks), and engine warm-up.

Funding mechanisms and or incentives: Propose legislation to partially fund idling technology loan grants for innovative truck stop electrification, focusing grants on high idling areas. A small tax on diesel fuel might be considered as a means for funding truck stop electrification. Tax credits may be available for installing electrification through the National Energy Bill. Truck stop owners could offer their own incentives for the use of electrification (e.g., credits for free hours of electrification with the purchase of a specified amount of diesel).

Voluntary and or negotiated agreements: Encourage participation in EPA's SmartWay Transport Partnership (or similar programs).

Codes and standards: Develop a statewide ordinance banning idling by heavy-duty diesel commercial trucks and buses

Pilots and demos: Investigate availability of funding for a pilot project demonstrating the use of solar-powered truck-stop electrification. Evaluate the effectiveness of the pilot program before implementing on a broader scale.

Related Policies/Programs in Place

None identified.

Types(s) of GHG Reductions

Reducing idling will reduce black carbon emissions, as well as all other GHG exhaust emissions (CO_2, CH_4, N_2O) through reduced fuel consumption. However, it is important to also ensure that any technologies used to reduce idling have lower emissions than the diesel truck idling emissions they are replacing.

Estimated GHG Savings and Costs per MTCO2e

	2012	2020	Units
GHG Emission Savings	0.34	0.49	MMtCO2e
Net Present Value (2006-2020)			$million
-at $2.40/gallon diesel		$20	
-at $3.40/gallon diesel		$-336	
Cumulative Emissions Reductions (2006-2020)		5.1	MMtCO2e
Cost-Effectiveness			$/tCO2e
-at $2.40/gallon diesel		$4	
-at $3.40/gallon diesel		$-66	

- **Data Sources:**

American Transportation Research Institute, "Idle Reduction Technology: Fleet Preferences Survey," February 2006 for technology costs.

EPA Smartway Transportation Partnership (http://www.epa.gov/otaq/smartway/idlingtechnologies.htm#truck-mobile) for technology costs.

"Analysis of Tehcnology Options to Reduce the Fuel Consumption of Idling Trucks," ANL/ESD-43, Argonne National Laboratory, Transportation Technology R&D Center, June 2000 for information on technology impacts.

Data from EPA's MOBILE6 model to estimate the proportion of CO2 emissions attributable to Class 8 trucks.

Data from USDOE/EIA *Annual Energy Outlook 2005* to estimate the amount of fuel consumed annually per truck.

- **Quantification Methods:** The estimated reduction in CO2 emissions from reduced idling was calculated based on estimating the portion of emissions and fuel consumption in the NM inventory that were attributable to Class 8 diesel trucks, estimating the portion of the total fuel consumption that would be consumed during idling, and applying a targeted reduction of 80 percent to this amount starting in 2008 and a reduction of 100 percent starting in 2015.
- **Key Assumptions:** This analysis will assume idle reductions are achieved only by Class 8 diesel truck population; these trucks idle for an average of 6 hours per day; they consume 0.8 to 1.2 gallons of diesel per hour during idling; and that a 80 (by 2010) or 100 (by 2020) percent reduction of diesel idling from these Class 8 trucks will be achieved.

The cost analysis assumes a 5-year lifetime for idling technology equipment, applied to 80 percent of Class 8 vehicles starting in 2008 and 100 percent of Class 8 vehicles starting in 2015, at a cost of $6,000 per vehicle and a $2.40 per gallon diesel cost.

Program administration costs, enforcement costs, and fines have not been factored into the cost analysis. Reduced vehicle maintenance costs have not been factored into the analysis.

Key Uncertainties

A small additional reduction in idling emissions could be achieved by buses, as well as other diesel trucks and gasoline vehicles and trucks that has not been quantified here.

The distribution of technology that would be selected by these trucks or fleets to reduce their emissions is highly uncertain. This will have a significant impact on the overall cost/cost savings of this measure. The use of these technologies will also cause a slight decrease in the CO2 and fuel consumption reductions achieved. The use of truck stop electrification would increase emissions from electricity generation.

Equipment cost and lifetime will vary by technology employed. The cost value selected was based on cost data summarized by American Transportation Research Institute, representing the capital costs of a variety of idle reduction technology. The cost of $6,000 per vehicle represents a mix of higher and lower technology costs. The cost analysis does not take into account the number of vehicles that have already installed idle reduction technologies.

Contributing Issues

Reductions in idling will also reduce emissions of toxics, NOx, and PM. California estimates that 70 percent of toxic risk comes from diesel engines.

Idle emission reductions will reduce fuel consumption, thus leading to a cost benefit from reduced operating costs.

Additional costs are associated with on-board idle reduction technologies, but fuel savings over time typically lead to a net savings.

Feasibility Issues

N/A

Status of Group Approval

Pending

Level of Group Support

Pending

Barriers to Consensus

Pending

TLU – 15, Intermodal Freight Initiatives

Policy Description

Transfer freight carried over the roadway system to rail wherever possible.

Policy Design

Carrying freight by rail rather than truck can significantly reduce emissions and fuel consumption, while at the same time reducing congestion on major roadways. A number of small abandoned rail lines already exist in New Mexico. A primary goal of this measure is to restore those lines, which will allow freight to be carried by rail directly to a number of warehouses and industrial sites in existing developed areas. This would also provide an incentive to reduce sprawl from these businesses. Electrifying rail should also be considered.

- **Goals:** Reduce VMT from heavy-duty freight trucks by xx% through the transfer of freight to rail.
- **Timing:** TBD
- **Coverage of parties:** TBD
- **Other:** N/A

Implementation Mechanisms

TBD

Related Policies/Programs in Place

N/A

Types(s) of GHG Reductions

Primarily CO_2 through reduced heavy-truck VMT; also black carbon, N_2O, and CH_4 from vehicle exhaust.

Estimated GHG Savings and Costs per MTCO2e

TBD

- **Data Sources:**

  Information from American Association of Railroads

"Industry Options for Improving Ground Freight Fuel Efficiency—Technical Report," prepared for USEPA by ICF Consulting, 2002.

- **Quantification Methods:** TBD

- **Key Assumptions:** TBD

Key Uncertainties

TBD

Contributing Issues

Reduced diesel fuel consumption.

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

Pending

Barriers to Consensus

Pending

TLU – 16, Reduced Speed Limit for Commercial Trucks

Policy Description

Reduce speed limit for commercial trucks to 60 or 55 mph. By reducing the vehicle speed, fuel economy is increased, reducing fuel consumption and CO_2 emissions.

Policy Design

- **Goals:** Reduce Class 8 commercial truck traffic traveling above 60 or 55 mph on interstates, freeways, and major arterials by 50 percent.
- **Timing:** Begin enforcement of measure by 2008 with a 60 mph speed limit for Class 8 commercial trucks. Lower speed limit to 55 mph by 2015.
- **Coverage of parties:** NMDOT, state police
- **Other:** N/A

Implementation Mechanisms

Education/outreach: Provide information to the trucking industry and the general public about the fuel economy benefits obtained when reducing speeds from 70 mph to 60 or 55 mph. Emphasize fuel savings and safety aspects also.

Codes/standards: Have all interstates, freeways, and major arterials signed with a maximum speed of 60 or 55 mph for Class 8 commercial trucks. Significant enforcement resources will be needed to ensure the success of this measure.

Related Policies/Programs in Place

Current speed limits are as high as 75 mph, depending on the highway segment.

Types(s) of GHG Reductions

CO_2, black carbon

Estimated GHG Savings and Costs per MTCO2e

	2012	2020	Units
GHG Emission Savings	0.14-0.18	0.22-0.30	MMtCO2e
Net Present Value (2006-2020)			$million
-at $2.40/gallon diesel		$113-$150	

-at \$3.40/gallon diesel	\$-42 -\$-56	
Cumulative Emissions Reductions (2006-2020)	2.2-3.0	MMtCO2e
Cost-Effectiveness		\$/tCO2e
-at \$2.40/gallon diesel	\$50	
-at \$3.40/gallon diesel	\$-19	

- **Data Sources:**

  U.S. Department of Labor, Bureau of Labor Statistics, "Establishment Data; Hours and Earnings," Table B-14 and "Employer Costs for Employee Compensation-December 2005," Table 10.

  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.

  U.S. Environmental Protection Agency, Office of Transportation and Air Quality, MOBILE6 model, documented in "User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model," EPA420-R-03-010, August 2003.

  Ang-Olson, Jeffrey and William Schroeer, "Energy Efficiency Strategies for Freight Trucking: Potential Impact on Fuel Use and Greenhouse Gas Emissions," *Transportation Research Record 1815*, Transportation Research Board of the National Academy of Sciences, Washington, DC, 2002.

- **Quantification Methods:** The diesel fuel consumption from Class 8 diesel trucks was multiplied by 60 (low) or 80 (high) percent to account for the amount of fuel consumed at speeds above 60 mph from 2008 through 2014. Starting in 2015, the speed for Class 8 trucks was reduced to 55 mph. This fuel consumption was then multiplied by 50 percent to account for the expected penetration rate of this measure. This quantity was then multiplied by the percentage increase in fuel economy. The ratio of reduction in fuel consumption was then multiplied by the baseline CO2 emissions to estimate the reduction in CO2 from this measure. Costs were calculated by multiplying the per unit fuel cost by the number of gallons reduced and subtracting this from the product of the increased time required for traveling the same distances at 60 mph (prior to 2015) or 55 mph (2015 and later) rather than 70 mph multiplied by the hourly trucking industry cost.

- **Key Assumptions:** 60 to 80 percent of Class 8 diesel truck travel (fuel consumption) is spent at speeds above 60 mph, assumed to be at 70 mph on average. 50 percent of this truck travel is assumed to be reduced to 60 mph or 55 mph (Ang-Olson and Schroeer).

  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 (EPA).

  A fuel cost of \$2.40/gallon is assumed.

Average hourly truck transportation wage is $17.22/hour (BLS), with an industry average overhead rate of 1.48 (BLS).

Base fuel economy assumed to be 6.42 mpg (EPA MOBILE6 model); assumed to increase to 7.42 mph with this measure.

Key Uncertainties

Ability to enforce a speed limit significantly lower than current policy.

Contributing Issues

Some reduction in criteria pollutants. Reduction in fuel consumption. Increase in travel time required. Increased costs of speed enforcement are not included here. Should lead to increased driver safety which may decrease operating costs. Reducing speed is also likely to reduce truck maintenance costs.

Feasibility Issues

TBD

Status of Group Approval

Pending

Level of Group Support

Pending

Barriers to Consensus

Pending