Appendix H
Transportation and Land Use

Summary List of Policy Recommendations

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2015	2025	Total 2008–2025			
TLU Area 1. Reduce VMT (VMT goal to be established based on VMT implied by selected strategies)							
TLU-1	Improved Land-Use Planning and Development Strategies	0.7	1.9	14.9	*Net savings*	*Net savings*	Unanimous
TLU-2	Expand Transit, Bicycle, and Pedestrian Infrastructure	0.1	0.3	3.0	$0	$0	Unanimous
TLU-5	Climate-Friendly Transportation Pricing/Pay-as-You-Drive	1.1	2.1	20.9	–$1	–$1	Super Majority (3 objections)
TLU-7	"Fix-it-First" Transportation Investment Policy and Practice	*Not quantified*					Super Majority (2 objections)
TLU-9	Workplace Tools To Encourage Carpooling, Bicycling, and Transit Ridership	0.3	0.4	4.5	*Large net savings*	*Large net savings*	Unanimous
TLU-14	Freight Mode Shifts: Intermodal and Rail	*N/A*					Super Majority (1 objection)
TLU Area 2: Reduce Carbon per Unit of Fuel							
TLU-3	Low-GHG Fuel Standard	1.7	3.6	36.2	*Not quantified*		Unanimous
TLU Area 3: Reduce Carbon per Mile and/or per Hour							
TLU-4	Infrastructure Management	0.04	0.1	0.7	*Not quantified*		Unanimous
TLU-6	Adopt California Clean Car Standards	0.74	1.16	13.1	–$263	–$39	Majority (16 objections)
TLU-12	Voluntary Fleet Emission Reductions	0.4	0.4	6.1	*Not quantified*		Unanimous
TLU-13	Reduce Maximum Speed Limits	0.4	0.4	6.1	*N/A*	$50 at $2.40/gal –$19 at $3.40/gal	Majority (16 objections)
	Sector Total After Adjusting for Overlaps	**4.7**	**9.3**	**91.2**	***Not quantified***		
	Reductions From Recent Actions	**1.4**	**1.5**	**20.2**	***Not quantified***		
	Biodiesel	**0.64**	**0.75**	**8.1**			
	Ethanol	**0.78**	**0.79**	**12.1**			
	Sector Total Plus Recent Actions	**6.1**	**10.8**	**111.4**	***Not quantified***		

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled; $/tCO_2e$ = dollars per metric ton of carbon dioxide equivalent; N/A = not available. (TLU Policy Options 8, 10 and 11 were either dropped or merged during the process..)

Negative values in the Net Present Value and the Cost-Effectiveness columns represent net cost savings associated with the recommendations. Totals in some columns may not add to the totals shown due to rounding.

Overall Transportation and Land Use (TLU) Analysis Framework

- Transportation carbon emissions = miles driven × carbon per mile.
- Carbon per mile = vehicle emissions per unit × carbon per unit of fuel.

So, to reduce greenhouse gas (GHG) emissions requires:

TLU Area 1: Reduce the number of miles driven.

TLU Area 2: Reduce carbon per unit of fuel [Cleaner Fuels].

TLU Area 3: Reduce carbon per mile and/or per hour [Improved Vehicle Efficiency].

This Overall TLU Analysis Framework section summarizes for the Minnesota Climate Change Advisory Group (MCCAG) the most important policy option changes since the last MCCAG meeting and is organized by TLU Area.

TLU Area 1: Reduce the number of **miles driven.**

The following policies will all contribute to reducing miles driven:

- TLU-1 Land Use Planning and Development
- TLU-2 Transit, Bicycle, and Pedestrian Infrastructure
- TLU-5 Climate-Friendly Transportation Pricing [in part]
- TLU-7 Fix-It-First
- TLU-9 Commuter Choice
- TLU-14 Freight Mode Shifts: Intermodal and Rail

The following recommendations would reduce vehicle miles traveled (VMT).

Policy No.	Policy Recommendation	GHG Reductions* ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/MtCO2e)	Level of Support
		2015	2025	Total 2008–2025			
TLU Area 1: Reduce VMT by the sum of the VMT reductions from TLU recommendations 1, 2, 5, 7, 9, and 14.							
TLU-1	Improved Land Use Planning and Development Strategies	0.7	1.9	14.9	Net savings	Net savings	Unanimous
TLU-2	Expand Transit, Bicycle, and Pedestrian Infrastructure	0.1	0.3	3.0	$0	$0	Unanimous
TLU-5	Climate-Friendly Transportation Pricing/Pay as You Drive	1.1	2.1	20.9	–$1	–$1	Super Majority (3 objections)
TLU-7	"Fix-it-First" Transportation Investment Policy and Practice	Not quantified					Super Majority (2 objections)
TLU-9	Workplace Tools To Encourage Carpooling, Bicycling, and Transit Ridership	0.3	0.4	4.5	Large net savings	Large net savings	Unanimous
TLU-14	Freight Mode Shifts: Intermodal and Rail	NA					Super Majority (1 objection)
TLU-1 Total		**2.2**	**4.7**	**43.3**	**N/A**		

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/MtCO2e = dollars per metric ton of carbon dioxide equivalent; VMT = vehicle miles traveled; N/A = not applicable.

The TLU Area 1 Overall VMT reduction goal is roughly 10.3 billion VMT in 2025, for a 2025 VMT of 56,530,900,000.

TLU Area 2: Reduce carbon per unit of fuel [Cleaner Fuels].

- TLU-3 Low Greenhouse Gas Fuel Standard

TLU-3 would contribute as follows:

Policy No.	Policy Recommendation	GHG Reductions* ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/MtCO2e)	Level of Support
		2015	2025	Total 2008–2025			
TLU Area 2: Reduce carbon per unit of fuel							
TLU-3	Low GHG Fuel Standard (Overlap With AFW-7)	1.7	3.6	36.2	Not quantified		Unanimous

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/MtCO2e = dollars per metric ton of carbon dioxide equivalent; AFW = Agriculture, Forestry, and Waste Management.

TLU Area 3. Reduce per vehicle energy consumption [Improved Vehicle Efficiency].

- TLU-4 Infrastructure Management
- TLU-5 Climate-Friendly Transportation Pricing [in part]
- TLU-6 Adopt California Clean Car Standards
- TLU-8 Update Road Standards [in part]
- TLU-12 Mobile Source Emissions Reduction
- TLU-13 Reduced Speed Limits

Recommendations in this area give the following reductions:

Policy No.	Policy Recommendation	GHG Reductions* ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/MtCO$_2$e)	Level of Support
		2015	2025	Total 2008–2025			
TLU Area 3: Reduce carbon per mile and/or per hour							
TLU-4	Infrastructure Management	0.04	0.1	0.7	*Not quantified*		Unanimous
TLU-6	Adopt California Clean Car Standards	0.74	1.16	13.1	–$263	–$39	Majority (16 objections)
TLU-12	Voluntary Fleet Emission Reductions	0.4	0.4	6.1	*Not quantified*		Unanimous
TLU-13	Reduce Maximum Speed Limits	0.4	0.4	6.1	N/A	$50 at $2.40/gal $–19 at $3.40/gal	Majority (16 objections)
	Total	**1.58**	**2.06**	**26.0**	**N/A**		

Summary discussion of emission reductions by TLU Area

Context Question: If GHG reductions required by Minnesota law come from the transportation sector in the same percentage as they are generated today, then what is the transportation and land use sector target amount?

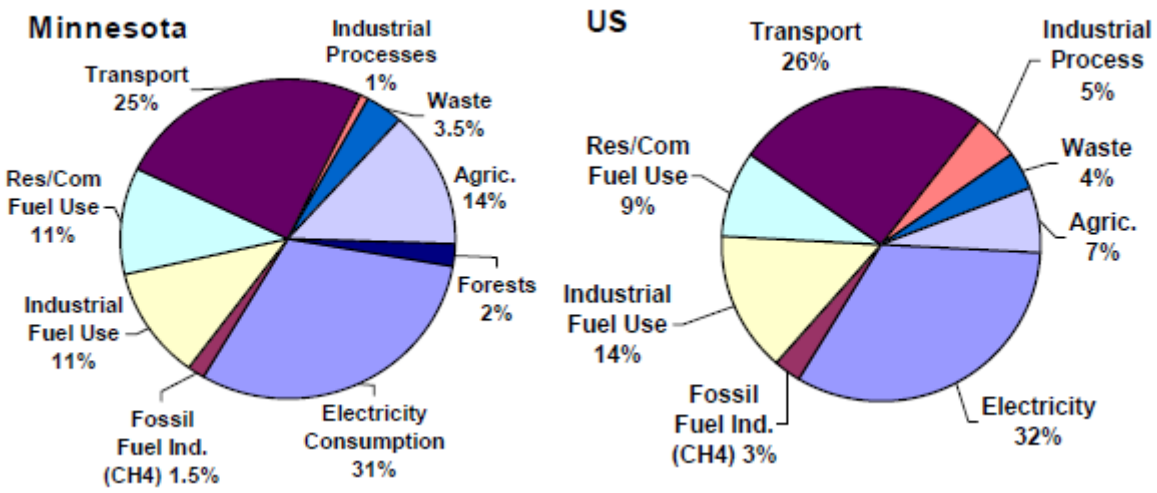
Answer: Keeping in mind that the MCCAG process does not require or assume proportional emission reduction contributions from each sector, the targets are

1. Statewide GHG emission reduction goals of 15% by 2015, 30% by 2025, and 80% by 2050, using 2005 emissions as a benchmark.

2. In 2005, activities in Minnesota accounted for approximately 151 million metric tons of carbon dioxide equivalent ($MMtCO_2e$) emissions.

3. Transportation is 25% of Minnesota emissions, as in Figure H-1.

Figure H-1. Gross GHG emissions by sector, 2000: Minnesota and United States



Thus, proportional reductions from TLU would be:

155.00	$MMtCO_2e$ in 2005
–0.45	Biofuels existing actions not accounted for in baseline
154.55	
* 30%	reduction by 2025
46.37	$MMtCO_2e$ reduction in 2025
* 25%	Transportation share
11.59	**$MMtCO_2e$ reduction from T in 2025**

TLU-1. Improved Land-Use Planning and Development Strategies

Policy Description

This policy improves land use planning and development practices to target growth in ways that reduce the number and length of vehicle trips, thus reducing GHG emissions. (It accounts for part of the VMT reduction goal, along with TLU-2, -5, -7, -9, and -14.)

Policy Design

Goals:

Guide new households into currently developed areas.

Twin Cities Metropolitan Area—Target a higher percentage of new development into "priority growth areas" within 65 cities the Metropolitan Council (MC) classifies as "developed" (e.g., Minneapolis, St. Paul, Burnsville, Coon Rapids, Mendota Heights, Stillwater, and Minnetonka).

- Increase to 60% the percentage of housing targeted to the developed area for 2013–2030 (currently 27%–30% in the MC Development Framework for 2000–2030).
- Increase to 75% the percentage of jobs targeted to the developed area for 2013–2030 (currently 55% in the MC Development Framework for 2000–2030).

Greater Minnesota—Target a significantly higher percentage of new growth in jobs and housing into incorporated cities in locations that can be accessed by bicycling, walking, and public transit.

Timing: To achieve VMT goals, policy implementation should commence as soon as possible.

- Best practices technical assistance to be developed in 2008–2009 and promoted starting in 2010.
- Statewide and regional planning goals to be incorporated in next MC Development Framework and implemented beginning in 2013.

Statewide—Reduce subsidies for low-density, auto-oriented development patterns, and provide incentives and technical assistance to communities to target growth in priority growth areas where walking, bicycling, transit use, and shorter auto trips can reduce VMT.

Parties Involved: All levels of government, including local, county, school district, regional, and state; developers and contractors; employers; homeowners.

Other: None.

Implementation Mechanisms

To achieve these VMT reduction goals, the state, MC, and local communities will need to use some or all of the following strategies that have been used in other states and regions.

1. **Priority Areas Designated for Planned Growth**

   Establish a process to designate types of priority growth areas within the state, such as town centers, downtowns, regional centers, neighborhood centers, transit corridors, transit station areas, and brownfields (old commercial or industrial sites). Establish a process to encourage higher-density housing and employment growth; mixed-use and mixed-income development; and bicycle, pedestrian, and transit-friendly development within these areas. Development would be promoted through incentives, technical assistance, and/or regulation.

2. **School Siting and Accessibility**

   Review and revise school siting laws in Minnesota to remove excessive acreage requirements that drive schools into undeveloped areas. Encourage the development or rehabilitation of schools in priority growth areas, to make it easier for children, teachers, and parents to get to school on foot, bicycle, and transit.

3. **Jobs–Housing Balance**

   Plan and zone for new housing development to be near existing jobs, and plan and zone for new commercial development near existing housing. Implement financial incentives and/or regulation to encourage a range of housing types and affordability levels that support a community's local work force, which will create a stronger jobs/housing balance and reduce the length and number of vehicle trips.

4. **Smart-Growth Planning, Modeling, and Tools**

   Institute statewide and municipal planning requirements and/or incentives to implement TLU-1. Continue planning requirements in the Twin Cities metropolitan area, require state planning to implement TLU-1, and support planning for municipalities throughout greater Minnesota.

   Provide technical assistance to communities on best practices in zoning, parking, and street design to increase walking, bicycling, and transit use; to encourage higher-density, transit- and walking-oriented development; and to balance regional residential, commercial, and industrial needs. An example of this type of effort is Oregon's Transportation and Growth Management technical assistance program, accessible at: http://www.lcd.state.or.us/LCD/TGM/index.shtml

   Create an integrated transportation and land-use forecasting model for use statewide. This tool would enable communities to predict increased VMT and GHG emissions based on proposed developments.

   Create a development cabinet, or other government oversight group, that guides state investments to reduce VMT and GHG emissions.

5. **Targeted Open Space Protection**

   Establish programs and/or requirements to preserve key forestland, natural areas, agricultural land, and parkland, which will help to guide development and redevelopment into targeted growth areas.

6. Transportation Investments

Transit- and Pedestrian-Oriented Development—Plan for and invest in transit- and pedestrian-oriented corridors that will draw and support higher-density, mixed-use development along bus corridors and at rail stations.

Complete Streets and Well-Connected Streets—Develop statewide guidance and technical support for Complete Streets and Well-Connected Streets to shorten trip distances, to make walking and walking to transit safer and more convenient, to reduce the need for large urban arterial roads, and to support higher-density development.

7. Funding

Target new and existing transportation and housing dollars from regional, state, and federal sources to projects that help meet these land-use and development goals.

Related Policies/Programs in Place

- Metropolitan Livable Communities Program Tax Base Revitalization Account (TBRA) grants have funded projects in the metropolitan area to clean up polluted land and buildings for redevelopment, create new jobs and affordable housing, and direct growth to central cities and older suburbs. TBRA grant awards totaling $64.84 million were awarded from budgeted funds during the period 1996–2006. Those funds will leverage an expected $3.4 billion in private investment.
- MC provides Livable Communities Demonstration Account (LCDA) grants to metropolitan area communities for projects that result in connected development patterns that link housing, jobs, and services and use regional infrastructure efficiently. LCDA grant awards totaling $74.67 million were awarded from budgeted funds during 1996–2006. MC expects those funds to leverage more than $2.77 billion in private development investment.
- Minnesota Housing has a priority for housing development located near regional and interregional transportation corridors and transitways, in proximity to existing development and services. Minnesota Housing also supports new development that is not located near wetlands, steep slopes, critical habitat, or on prime farmland or parkland.
- Some counties have sold bonds to protect open spaces. MC plans to increase the regional park and open-space system from 53,000 acres to 70,000 acres. The parks plan calls for three new parks by 2030 and for four new regional parks to complete the system, post-2030.

Type(s) of GHG Reductions

Primarily CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

GHG Impacts

This policy option is part of the group of options that will contribute to fulfilling the broad VMT reduction goal. The TLU TWG assumes that

1. TLU-1 produces land-use changes that approximate the impacts modeled in Blueprint 2030 for the Twin Cities region (while noting that the recommendations here are not for a

return to Blueprint 2030 *per se*). Modeling for Blueprint 2030 forecast an approximately 12% region-wide decrease in VMT from the baseline.[1]

2. Those reductions are accomplished in urban areas of the state, not just the Twin Cities region. While the numeric goals above are for the Twin Cities region, the implementation mechanisms also apply to greater Minnesota, and will be especially effective in the urban areas of greater Minnesota.

The Twin Cities baseline VMT is 29,233,300,775. Total 2025 VMT in Minnesota urban areas is forecasted to be 42,028,452,537.

A 12% decrease from the latter figure is a reduction of 5,043,414,304 VMT in 2025. That is 6.0% of *all* VMT, which is then converted to CO_2 for use in the reductions table.

Costs/Cost Savings
All else being equal, buildings cost somewhat more to construct in urban areas than in suburban or exurban areas. The preponderance of the evidence, and of the academic review of that evidence, finds that increased private construction costs are more than paid for (1) through initial higher sales prices, and higher resale value over time, and (2) through substantial savings in reduced infrastructure costs.

Under a compact, transit-oriented development scenario, such as would be produced under this option, the Twin Cities metropolitan area would save $3 billion in infrastructure costs over 20 years.[2] A portion of those benefits would come from the transit use that improved land-use patterns would make possible. More compact land use alone would produce net cost savings, as the more compact development pattern by itself would save substantial portions of the $3 billion estimated by MC. A wide variety of literature supports MC's finding: integrated transportation and land-use planning produces net savings on total costs of buildings + land + infrastructure + transportation. Some portions of that total cost may be higher. The preponderance of literature suggests net savings overall.[3] A National Academy of Sciences/Transportation Research Board review found substantial regional and state-level infrastructure cost savings from more compact development, as shown in Table H-1.

[1] Keith Bartholomew (2005), Integrating Land Use Issues into Transportation Planning: Scenario Planning Summary Report, College of Architecture + Planning, University of Utah. Blueprint 2030 was developed by the Metropolitan Council and adopted by it on December 18, 2002. The subsequent Metropolitan Council replaced Blueprint 2030 with the 2030 Regional Development Framework.

[2] Metropolitan Council, Blueprint 2030, Appendix E, page 9.

[3] Literature reviews include US EPA (2001), "Our Built and Natural Environments: A Technical Review of the Interactions Between Land Use, Transportation, and Environmental Quality"; and Burchell et al. in footnote 8.

Table H-1. Burchell findings of savings of compact growth versus trend development[4]

Area of Impact	Lexington, KY, and Delaware Estuary	Michigan	South Carolina	New Jersey
Public–private capital and operating costs				
Infrastructure roads (local)	14.8%–19.7%	12.4%	12%	26%
Utilities (water/sewer)	6.7%–8.2%	13.7%	13%	8%
Housing costs	2.5%–8.4%	6.8%	7%	6%
Cost-revenue impacts	6.9%	3.5%	5%	2%
Land/natural habitat preservation				
Developable land	20.5%–24.2%	15.5%	15%	6%
Agricultural land	18%–29%	17.4%	18%	39%
Frail land	20%–27%	20.9%	22%	17%

Data Sources:

Fuel use: Minnesota Inventory and Forecast.

VMT forecasts: Federal Highway Administration, available at: http://www.fhwa.dot.gov/ohim/hs92/roads.pdf, MC Transportation Planning.

VMT reductions: MC, Blueprint 2030.

Quantification Methods:

As above. In addition to the modeling done for Blueprint 2030, a wide variety of literature finds that integrated transportation and land-use planning can substantially reduce VMT and its attendant emissions.[5] Because the Blueprint 2030 modeling did not use the most advanced available techniques to capture the VMT impacts of the modeled policies, the reductions estimates used here are likely to be conservative.[6]

Key Uncertainties

Vehicle miles traveled since 1990 have increased statewide by 45%. This is one of the fastest growth rates in the nation, far outpacing the state population growth of 19% in the same time period. The regions outside the Seven-County Metro area are responsible for much of the immense increase in VMT.

Reducing the number of miles that a vehicle travels through more strategic land-use planning and development is a policy approach that works primarily in urban areas where jobs and commercial services are more likely to be closer to residential growth areas. While the metro area held 52% of the state population in 1990, it produced only 45% of the annual state VMT. In 2005, the metro area had 54% of the statewide population and 40% of the state VMT. By 2025, the

[4] Robert Burchell, et al., *The Costs of Sprawl—Revisited (TCRP Report 39)*, Transportation Research Board/National Research Council/National Academy Press, Washington, DC, 1998.

[5] U.S. Environmental Protection Agency, *Our Built and Natural Environments: A Technical Review of the Interactions Between Land Use, Transportation, and Environmental Quality*, 2001. http://www.epa.gov/dced/built.htm

[6] Bartholomew, footnote 2, above.

percentages will continue to diverge to 58% of the statewide population in the metro area, yet only 36% of the state VMT. Per capita VMT is expected to grow very little in the metro area by 2025, yet it is projected to increase dramatically statewide.

Reducing the number of miles traveled is a crucial component to reducing harmful GHG emissions, even with increased clean fuel and efficiency. The burden of reducing the number and lengths of trips taken will be concentrated on the seven-county metropolitan area and the population growth centers in greater Minnesota, and should be considered when recommending policies. Whether Minnesota strives to achieve the number of annual VMT overall or based on per capita as the state did in 1990, policies for reducing the number and length of travel trips will be targeted to the metro area and greater Minnesota growth centers.

How to manage VMT statewide needs more analysis and is a key uncertainty to pursue.

Additional Benefits and Costs

1. Makes transit service more feasible and cost-effective (need a minimum of 8 residential units per acre for minimum-level bus service, 15 units per acre for frequent bus service, and 30 units per acre for rail service).
2. Improves public health by making it easier and safer for people to walk.
3. Reduces the number and severity of vehicle crashes by reducing the number of high-speed, high-traffic arterial streets and by making walking and bicycling safer.
4. Supports social interaction with more people walking, bicycling, and riding public transit.
5. Reduces air pollution. Blueprint 2030 forecasted a 50% decrease in nitrogen oxide (NO_x) emissions in 2030 relative to the baseline.
6. Reduces urban land consumption, keeping Minnesota land in agriculture and open space. Blueprint 2030 forecasted a 35% decrease in land consumption relative to the baseline.

Personal Risk

There are divergent views about the change in personal risk that accompanies more compact development. Many people believe that personal danger/risk from criminal activity is greater in higher-density living and in the inner city and first-ring suburbs, and give this reason for new development farther from core cities. The contrary view argues that the concern about personal safety and more dense forms of development is often based on perceptions of failed public housing efforts of the past that geographically isolated low-income households in high-rise residential developments.

However, new, more compact, mixed-use, and mixed-income forms of development in central cities and developed suburbs have established some of the most attractive and livable neighborhoods in other regions. Market research by the National Association of Realtors shows that more and more buyers prefer living in neighborhoods that are more compact and offer more activities and less need to drive, and that those preferences are reflected in market premiums. These new forms of compact development provide more personal safety because they put “eyes on the street” and give all residents a sense of ownership in the public spaces.

The annual cost to government to establish planning programs, to provide new planning tools, to review current funding and reposition funding criteria to encourage growth in priority areas, and to provide technical assistance could be $10–$20 million.

Feasibility Issues

The TLU TWG members raised two general feasibility questions:

- Are the goals numbers achievable, given existing development patterns, market patterns, and investment trends?
- Have the implementation mechanisms included enough tools to allow communities to reach these goals?

MC believes that the goals in its current Development Framework are at the edge of likely feasibility.

Status of Group Approval

Approved

Level of Group Support

Unanimous

Barriers to Consensus

None

TLU-2. Expand Transit, Bicycle, and Pedestrian Infrastructure

Policy Description

This strategy expands infrastructure and programs to increase transit ridership, carpooling, bicycling, and walking. It will reduce GHG emissions by reducing VMT (fewer vehicle trips and shorter trip distances). (It accounts for part of the VMT reduction goal, along with TLU-1, -5, -7, -9, and -14.)

Policy Design

Goals:

- Implement MC's transit plan to double transit ridership by 2020 (from 75 million rides annually to 150 million), 10 years sooner than the current target date of 2030. The plan calls for investment in light rail, commuter rail, bus rapid transit, and expanded bus service.
- Improve and expand transit (rail and bus) service between regional centers in greater Minnesota and the Twin Cities region, including Rochester, Marshall, Moorhead, Winona, Bemidji, Duluth, Detroit Lakes, Mankato, Grand Rapids, East Grand Forks, and other regional centers. Provide and ensure adequate service between these communities and the Twin Cities region (specifically, the Minneapolis St. Paul airport, downtown Minneapolis, and downtown St. Paul).
- Increase bike and pedestrian infrastructure in cities across Minnesota, including sidewalks, trails, bike lanes, and other amenities that make walking and bicycling safer and more convenient.

Timing: Begin implementation by 2008 and complete implementation by 2020.

Parties Involved: State legislature, MC, MnDOT, Metropolitan Transitways Development Board, counties, cities, freight rail, private sector businesses.

Other: None cited.

Implementation Mechanisms

1. Expand Transit Service

- The MC transit plan calls for adding light rail, commuter rail, and dedicated busways and increasing regular route bus service by 80% (more routes and more frequent service). This expansion would also include additional marketing, promotion, and pricing incentives (including tax incentives for nonprofit organizations).
- Expand transit service between greater Minnesota and the Twin Cities metropolitan area via intercity bus and Amtrak.

2. Expand Bike and Pedestrian Infrastructure

- Support walk and bike access to destinations and to transit by adding and improving sidewalks, trails, bike lanes, and other amenities (e.g., lighting, landscaping, bike parking, and lockers).

Related Policies/Programs in Place

Recent Actions in Minnesota:

- The MC Transportation Advisory Board programmed $95.6 million in Transportation Enhancement and Surface Transportation Program funds between 1992 and 2005 for public transit, bicycling, and walking, of total state and federal funding. Transit for Livable Communities is implementing a 4-year, $25 million federal pilot program to increase rates of bicycling and walking targeted to Minneapolis.
- In 2006, Minnesota voters approved a constitutional amendment requiring dedication of motor vehicle sales tax funds to transit, which will result in increased finding.
- The Twin Cities region has two high-occupancy vehicle (HOV) lanes (I-394 and I-35W). I-394 is a high-occupancy toll (HOT) lane that allows single-occupant vehicles to use the HOV lane for a fee. A memorandum of understanding between MC and MnDOT provides for consideration of additional HOT lanes in future highway improvements.

Type(s) of GHG Reductions

Primarily CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources:

Average length of transit trip: Federal Transit Administration.

Quantification Methods:

GHG Reductions

Transit:

- 75,000,000 new transit rides × 6.71 miles per 7-county transit trip.[7]
- 13-county transit averages 8.53 miles/trip. The TLU TWG used just 7-county transit averages to be conservative.
- Total VMT reduced in 2025: 503,250,000, or 1.27% of all light-duty VMT statewide.
- Assumed that transit growth from this policy started in 2008, grew smoothly to the 2025 VMT reduction level, and then converted to CO_2.

Bike and Pedestrian:

- The policy option does not include specific goals for new bike and pedestrian spending or activity. Substantial literature documents the positive response of bike and pedestrian

[7] See http://www.metrocouncil.org/planning/transportation/TBI_2000/TravelTimeTripLength_7County.pdf

activity to improved infrastructure.[8] However, without a new infrastructure target in this policy option, it is difficult to quantify the likely impacts of this policy.

Costs

The additional cost to implement the MC transit plan on an accelerated time frame is estimated to be $210 million per year for 13 years, or nearly $3 billion.

Savings

A report prepared in 2002 by an MC consultant hired to study regional growth development options showed a $3 billion savings in infrastructure costs over 20 years under a compact development scenario focused to some degree along pubic transit routes for the Twin Cities metropolitan area. (Blueprint 2030 Appendixes, item E, page 9.)

The ~$3 billion cost minus ~$3 billion infrastructure savings = a net cost of $0. That zero net cost does not include a variety of other savings. For example, reducing VMT and increasing reliance on public transit will result in a reduced parking demand, lower household costs for transportation, decreased traffic congestion, improved air quality, reduced need and cost for roadway expansion, and improved health for new transit riders who walk or bicycle to transit.

The University of Minnesota's *Full Costs of Transportation in the Twin Cities Region* report concluded that the total cost of a mile of auto travel in the region was between $0.84 and $1.62, with a mid-range estimate of $1.14. With the costs of the transit accounted for above, these are net savings:

503,250,000 VMT × $1.14/mile = $573,705,000

A wide variety of empirical experience suggests that the transit investments in this option will produce substantial additional benefits/net savings, as in the following examples.

- *Transit investments generally*—Nationally, transit produces net economic returns on investment: "For every $10 million invested, over $15 million is saved in transportation costs to both highway and transit users. These costs include operating costs, fuel costs, and congestion costs." These are in addition to the ancillary benefits summarized below.[9]
- *Transit fare initiatives*—Unlimited Access transit at the University of California–Los Angeles costs $810,000 a year and has total benefits of $3,250,000 a year.[10] Similar programs at other universities show similar results.[11] Universities are in some senses unique institutions, but the general types of challenges (especially demand for and cost of providing

[8] For example, Jennifer Dill and Theresa Carr (2002), *Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them—Another Look*, Portland State University, Portland, Oregon, available at: http://www.des.ucdavis.edu/faculty/handy/ESP178/Dill_bike_facilities.pdf. "Study confirms findings that cities with higher levels of bicycle infrastructure also have higher levels of bicycle commuting."

[9] Cambridge Systematics, Inc., *Public Transportation and the Nation's Economy: A Quantitative Analysis of Public Transportation's Economic Impact*, 1999, available at: www.apta.com/research/info/online/documents/vary.pdf

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

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

parking), and the types of benefits enjoyed in response to commute benefits programs, are equally available to businesses, even businesses located in what would normally be thought of as locations unsupportive of transit use:

> "Eco Passes also offer significant advantages for employers who offer free parking to all commuters, because those who shift from driving to transit will reduce the demand for employer-paid parking spaces. A survey of Silicon Valley commuters whose employers offer Eco Passes found that the solo-driver share fell from 76 percent before the passes were offered to 60 percent afterward. The transit mode share for commuting increased from 11 percent to 27 percent. These mode shifts reduced commuter parking demand by approximately 19 percent.
>
> "Given the high cost of constructing parking spaces in the Silicon Valley, each $1 per year spent to buy Eco Passes can save between $23 and $333 on the capital cost of required parking spaces."[12]

- *Transit and non-SOV options information and promotion*—Per public dollar, a Minnesota Transportation Management Organization (TMO) can accommodate seven times as many commuters as new highway investment.[13]

Key Assumptions: Above.

Key Uncertainties

None cited.

Additional Benefits and Costs

[The benefits of decreases in criteria air emissions will be analyzed at a later date.]

Feasibility Issues

None cited.

Status of Group Approval

Approved

Level of Group Support

Unanimous

Barriers to Consensus

None

[12] Ibid., 260.

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

TLU-3. Low-GHG Fuel Standard

Policy Description

The State of Minnesota would adopt a low-GHG fuel standard (LGFS) and create a market-based program to reduce the GHG emissions from transportation fuels and diversify transport fuel options for consumers. The LGFS would be designed to require fuel providers to reduce the GHG intensity of the fuels they sell in Minnesota. Fuel providers are identified as producers, importers, refiners, and blenders. The GHG intensity is specified as a CO_2 equivalent[14] per British thermal unit. The LGFS would not be designed to encourage the use of any particular fuel. Instead, it would include fossil and renewable fuels.[15]

The LGFS is not a tailpipe standard for GHGs, as it considers GHG emissions on a full-fuel-life-cycle basis, which includes not only tailpipe emissions, but also emissions associated with the production and distribution of fuels. This will result in varying carbon impact values for fuels that would ostensibly be the same to customers.[16]

Policy Design

Goals: Adopt a state law requiring the average carbon intensity of on-road transportation fuel to be reduced by 10% by 2020 and by 12% by 2025 from 2007 levels. (Note that California's low-carbon fuel standard (LCFS) requires a 10% reduction by 2020.) Other policies seek to reduce consumption of motor fuels, while this approach changes the fuel mix to reduce GHGs.[17]

Timing: As noted above.

Parties Involved: All levels of government and fuel providers.

Implementation Mechanisms

- Partnership with the University of Minnesota and the MnDOT to create the framework for the LGFS.
- Market-based mechanisms for fuel providers to choose how they wish to meet the LGFS.

---

[14] Each GHG has a global warming potential (GWP) that allows it to be expressed in terms of CO_2. This notation is referred to as carbon dioxide equivalent (CO_2e). For example, methane (CH_4) has a GWP of 23. Therefore, 1 metric ton (Mt) of CH_4 can be expressed as 23 $MtCO_2e$.

[15] Alternative fuels are defined in the Energy Policy Act of 1992 and include biodiesel, electricity, ethanol, hydrogen, natural gas, and propane.

[16] For example, E10, in which the ethanol is derived from cellulose, has the potential to reduce the full-fuel-life-cycle carbon impact compared with E10 in which the ethanol is derived from corn. How the ethanol is made affects its life-cycle GHG profile, and not all corn ethanol is exactly the same. Cellulosic E10, while potentially better in its GHG profile than sugar-based (corn) ethanol, will also vary depending on feedstock(s) and thermal heat input source(s).

[17] Note that the goal is to reduce the average carbon intensity of a gallon of fuel, not the carbon content of the full fuel stream.

- Full-fuel-life-cycle basis of measuring GHG impact of transportation fuels. Implemented by a cap-and-trade system for fuel providers.
- Financial incentives for refueling station creation and retrofitting based on the LGFS, and possibly for other institutions helping substitute low-GHG-fuels for high. For example, truck-stop electrification may substitute low-GHG fuel and fuel use for high.
- Certification process.

Related Policies/Programs in Place

Recent Actions in Minnesota:

- The current state policy for fossil diesel displacement is 2% biodiesel blend. For gasoline displacement, the current policy goal is 20% ethanol displacement by 2013, with a carve-out goal for 5% derived from cellulosic material. The current petroleum displacement goal is for 20% of the liquid fuel sold in the state to come from renewable sources by 2015, and 25% by 2025.
- Metro Mobility uses the highest level of biofuel allowable by operating conditions and vehicle manufacturers.
- Metro Transit, which uses B5 (5% biodiesel), is testing B20 (20% biodiesel). Metro Transit is considering using B10 (10% biodiesel) by mid-2007, pending B20 test results. The agency is also looking for other engine technology that uses other types of renewable fuels.
- Formation of the NextGen Energy Board to determine how the state can invest most efficiently to achieve energy independence—$90 million from 2010 to 2020.
- Ethanol: Minnesota established an ethanol production incentive to pay producers to help develop a new market for Minnesota's agricultural products. On the market side, Minnesota requires that all gasoline sold in the state be blended with a 10% ethanol mix. In addition, Minnesota began efforts in 1997 to develop a network of fueling stations for flex-fuel vehicles that could run on an 85% ethanol blend. Today Minnesota has over 300 E85 fueling stations around the state that together sold 18,160,000 gallons of E85 blended gasoline during 2006. See http://www.pca.state.mn.us/programs/ethanol.html and http://www.pca.state.mn.us/programs/ethanol.html#links
- Biodiesel: According the U.S. Department of Energy (DOE), biodiesel has the most favorable energy balance of any transportation fuel. For every unit of energy needed to produce a gallon of biodiesel, 3.2 units of energy are gained. As of September 29, 2005, Minnesota requires nearly all diesel fuel sold in the state to contain at least a 2% biodiesel blend. It is estimated that this requirement will replace 16 million gallons of diesel fuel in the state (Minn. Stat. §239.77).
- Electricity: According to recent information provided by the Minnesota Pollution Control Agency (MPCA), electricity as used in a hybrid gas/electric vehicle is a very low-GHG fuel source. Compared with conventional gasoline and reformulated gasoline, electric/gas hybrids show a 37.2% reduction in GHG emissions in grams per mile. This is compared with a 1.5% reduction for E10, a 15.6% reduction for E85 flex fuel, and a 25.5% reduction for conventional and low-sulfur diesel.

Recognizing the potential benefits of hybrids, plug-in hybrids, and electric vehicles for reducing GHG emissions, Minnesota has taken a number of steps to encourage their development, including an appropriation of over $2 million for the 2008–2009 biennium for studying and testing plug-in hybrid electric vehicles.

Type(s) of GHG Reductions

All GHG types in the fuel life cycle.

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources:

David Crane and Brian Prusnek, "The Role of a Low Carbon Fuel Standard in Reducing Greenhouse Gas Emissions and Protecting Our Economy," California Air Resources Board, January 8, 2007.

Quantification Methods:

Because the LGFS would mandate a 10% decrease in carbon content, the high-level analysis is relatively straightforward: a straight 10% decrease in the baseline on-road carbon emissions in 2020.

The LGFS would take into account the full fuel cycle when calculating that carbon content. Because the current Inventory and Forecast is not on a full fuel cycle basis, that analysis is not done here either.

Key Assumptions:

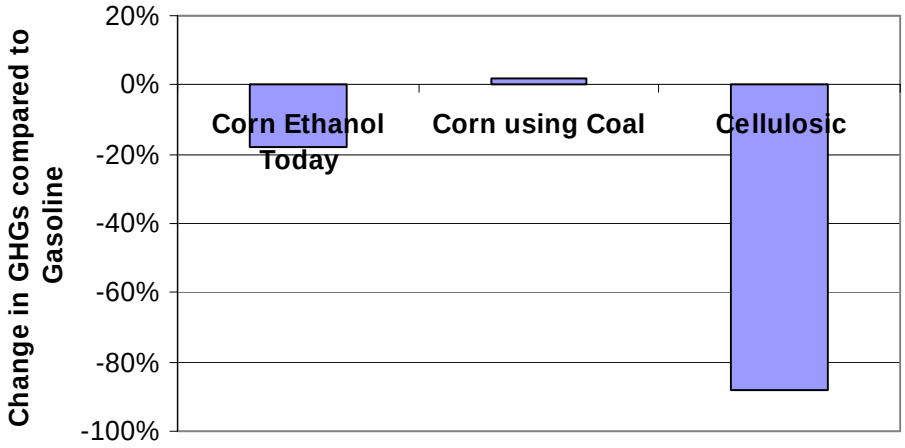
That fuels technologies advance sufficiently to allow these goals to be met. Research by the University of California on the achievability of the California LCFS finds:

> "On the basis of a study of a wide range of vehicle fuel options, we find a 10 percent reduction in the carbon intensity of transportation fuels by 2020 to be an ambitious but attainable target. With some vehicle and fuel combinations, a reduction of 15 percent may be possible."[18]

Different full-fuel-cycle analysis ("well-to-wheels" or "field-to-wheels") methods show different total carbon amounts per gallon for the same fuel pathway. For example, different models show different results for ethanol using corn as a feedstock, and distilled ethanol with a given energy source (e.g., electricity from coal, on-site natural gas). Adopting this policy will require the state to establish an official analytical method that distinguishes between the carbon impacts of two fuels that are essentially the same at the pump, yet have very different production origins. Figure H-2 illustrates one analysis of the potential range of carbon impacts from ethanol. The chart is included here *not* to establish recommended or likely impacts from different methods of ethanol production, but simply to illustrate the potential range of impacts from a single fuel type using a given analytical method, which can range from an increase in emissions relative to gasoline, to a significant decrease. A well-specified LGFS would account for these differences.

[18] Alexander E. Farrell, Daniel Sperling, et al. A Low-Carbon Fuel Standard for California, Part 1: Technical Analysis, May 29, 2007. Executive Summary, p. 8. Available at: www.its.berkeley.edu/sustainabilitycenter, www.its.ucdavis.edu, and http://www.arb.ca.gov/fuels/lcfs/lcfs.htm

Figure H-2. Low-carbon fuel standard necessary to ensure GHG reductions from the use of biofuels



Source: Farrell, et al., "Ethanol Can Contribute to Energy and Environmental Goals," *Science* 27 January 2006: Vol. 311. no. 5760, pp. 506 - 508.

Table H-2 shows a similar range of potential reductions.

Table H-2. Estimated biofuel impacts on GHG emissions

Fuel/Technology	Blend	Feedstock	Reduction (grams of GHGs per mile)*	Normalized Reduction (100% blend)
Ethanol	E10	Corn	1.5%	15.0%
Ethanol	E10	Cellulosic	7.2%	72.0%
Ethanol	E85	Corn	17.6%	20.7%
Ethanol	E85	Cellulosic	83.2%	97.9%
Biodiesel	B20	Soy	9.9%	49.5%
Biodiesel	B20	Canola	11.2%	56.0%
Biodiesel	B20	Palm	12.0%	59.9%
Biodiesel	B100	Soy	53.9%	53.9%

*Ethanol reductions estimated relative to gasoline; biodiesel reductions estimated relative to diesel fuel. Actual reductions depend on many factors in the production, distribution, and use of fuels.

Sources: GREET v1.7 outputs; $(S\&T)^2$ Consultants, *Sensitivity Analysis of GHG Emissions From Biofuels in Canada,* 2006.

Cost

The TWG reviewed various approaches to potential costs of this scenario and agreed that, in absence of specific regulatory proposal and given fluid nature of technology, it is not possible to develop a useful cost number. California's materials developing its LCFS have specifically not estimated the likely costs of an LCFS.

Note that some reductions will come from future fossil fuel refinery efficiencies.

Key Uncertainties

LGFS could have a significant impact on Minnesota, in that E10, the current maximum ethanol blend percentage for non–flex-fuel vehicles, is the state mandated standard for all gasoline blends.

See extensive analysis and discussion by the California Environmental Protection Agency Air Resources Board (CARB) and related research by the University of California, Davis. Those studies review the technical challenges and uncertainties facing this type of policy. (See Alexander E. Farrell et al. A Low-Carbon Fuel Standard for California. Part 1: Technical Analysis, May 29, 2007. Part 2: Policy Analysis, August 1, 2007; available at: http://www.arb.ca.gov/fuels/lcfs/lcfs.htm. Specifically, see the assumptions about the cradle-to-grave performance of cellulosic ethanol, especially transporting the cellulosic materials to create cellulosic ethanol, and whether it will really dramatically reduce GHG emissions, considering there's no current transportation and distribution network for cellulosic materials like there is for corn.

Additional Benefits and Costs

Benefits:

- Additional farm income, with attendant benefits for rural families and communities.
- Improved urban health and air quality.
- Potential for market innovation in new technologies for both refiners and clean energy providers.

Costs:

- *Environmental*: There is extensive debate about the non-emission environmental impacts of biofuel production. In Minnesota, demand for additional biofuels would have substantial effect on demand for water and acreage, with subsequent impacts on water supplies and marginal and/or Conservation Reserve Program acreage. There is also extensive debate over the environmental impacts of a move to grass-based fuel feedstocks. Research at the University of Minnesota suggests that a return to harvestable prairie-type ecosystem, for example, would not support extensive prairie-like biodiversity.

  Those debates are too extensive to summarize here, other than to conclude that an LGFS would almost certainly increase the demand for Minnesota-based biofuels to some extent, and that increased demand would most likely have some negative environmental impact. Until the economics of an LGFS are clearer, it is not possible to forecast the extent to which an LGFS would produce additional demand for Minnesota-based biofuels, versus other types of fossil (natural gas) or renewable (wind, hydro) fuelstocks, or the resulting impacts.

- *Economic*: Minnesota farmers are realizing that higher grain prices are not necessarily beneficial, because they raise input prices for a range of other farm products.

Feasibility Issues

See Key Uncertainties, above.

Status of Group Approval

Approved

Level of Group Support

Unanimous

Barriers to Consensus

None

TLU-4. Infrastructure Management

Policy Description

With the state as a coordinator, this strategy will build on current efforts to create a seamless multimodal system to serve all transportation modes, improve traffic flow, and decrease vehicle idling and congestion (where it will not negatively affect bicycling and walking or induce additional vehicle trips). This strategy will also reduce carbon emissions by reducing the number and length of motor vehicle trips; increasing walking, bicycling, and transit use; and supporting development patterns that use these modes.

Policy Design

1. **Manage to reduce congestion.**
   State, regional, and local transportation agencies will make investments to

   - Synchronize traffic signals to improve traffic flow;
   - Provide priority signaling for buses on key transit corridors;
   - Improve incident management (vehicle crashes and breakdowns);
   - Provide real-time information for commuters about congestion, transit, and parking;
   - Install roundabouts where appropriate;
   - Test state-of-the-art parking strategies; and
   - Convert HOV or general lanes to HOT lanes with "profits" to transit alternatives.

2. **Manage to accommodate all modes.**
   State, regional, and local transportation agencies will change rules and policies to ensure that the needs of all users are taken into account in the design of new and rebuilt roads.

- Adopt a "Complete Streets" policy in Minnesota for all new and reconstructed roads. Ensure, through an inclusive process, that roads are designed to better serve all users, including vehicle drivers, transit users, pedestrians, freight and truck traffic, and bicyclists. (Exceptions can be made for rural roads between communities and so on.) Develop and apply an Urban Preservation Route street classification, similar to the Natural Preservation Route that exists today.
- Require and provide technical assistance to cities and counties to develop bicycle and pedestrian plans to identify local needs and priorities.
- Develop policies and guidelines for municipalities regarding street connectivity.

Goals: Use infrastructure management to reduce urban-area transportation emissions by 0.5% by 2025 relative to 2005.

Timing: 2008–2009 adoption, and then ongoing implementation.

Parties Involved: State legislature; all state, regional, and local agencies that deal with transportation; local elected officials; bike, transit, and pedestrian interests; Minnesota Trucking Association, others.

Other: None cited.

Implementation Mechanisms

The annual direct cost to government for strategies under Policy Design 1 could be $10–$30 million. The cost for strategies under Policy Design 2 could be $5 million per year.

Related Policies/Programs in Place

Using Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds, Minneapolis has implemented computerized traffic signals for better traffic flow. The 2007 CMAQ solicitation contains a funding program for traffic signal management and for a freeway on-ramp metering program.

Type(s) of GHG Reductions

Primarily CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources: Minnesota Inventory and Forecast.

Quantification Methods:

Infrastructure management can reduce emissions both by reducing VMT, and by reducing inefficient operation of the travel network—transit, auto, and truck. To recognize that infrastructure management can reduce emissions in several ways, the goal for this option is expressed in emission reductions. Proportional reductions are taken from total urban emissions, starting in 2008, and ramping up smoothly to 0.5% in 2025.

Key Assumptions:

The multimodal/Complete Streets portion of this option will have mode shift benefits, but these are likely captured in TLU-2.

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/MtCO$_2$e)	Level of Support
		2015	2025	Total 2008–2025			
TLU-4	Infrastructure Management	0.04	0.1	0.7	*Not quantified*		UC

Key Uncertainties

None cited.

Additional Benefits and Costs

Strategies that reduce congestion can result in significant economic benefits to the state. Some strategies that improve highway system efficiency have safety benefits (reduce vehicle crashes). In addition, strategies that reduce vehicle idling or stop-and-go traffic patterns will reduce emissions of criteria air pollutants (such as particulate matter), resulting in public health benefits.

Feasibility Issues

None cited.

Status of Group Approval

Approved

Level of Group Support

Unanimous

Barriers to Consensus

None

TLU-5. Climate-Friendly Transportation Pricing

Policy Description

This policy recommends that the State of Minnesota institute requirements and policies ensuring that drivers more fully pay the total costs of driving. This policy would encourage drivers to choose transportation alternatives, purchase more efficient vehicles, drive less, and/or drive more efficiently (combining trips). This option generally reduces VMT and GHG emissions. (This strategy accounts for part of the VMT reduction goal, along with TLU-1, -5, -7, -9, and -14.)

Policy Design

The University of Minnesota's *Full Costs of Transportation in the Twin Cities Region* report concluded that the total cost of a mile of automobile travel in the region was between $0.84 and $1.62, with a mid-range estimate of $1.14.[19] Drivers do not see all of those costs, for three general reasons:

1. A substantial portion of the costs is not variable, meaning that driving less does not save the person money. A good example of this is insurance, paid every 3 or 6 months. One goal of this policy is to increase the proportion of that cost that drivers and society can save by driving less.

2. A substantial portion is paid for by revenue streams that are not necessarily directly related to automobile use. For example, property taxes pay for a large portion of the costs of local roads. That nexus may be appropriate for various reasons, but one result is that the cost of vehicle mobility (of all kinds) is not borne by those vehicles.

3. Driving (of all kinds) produces substantial externalities, both positive and negative. Drivers do not see all of them. The impacts of the emitted CO_2 are the externality most central to the MCCAG process.

As a result, this set of policies recommends that Minnesota take action in four areas:

1. Implement a system to encourage the purchase and operation of low-GHG-emitting passenger vehicles.

2. Provide an incentive for auto insurance companies to institute a "pay-as-you-drive" (PAYD) system for policyholders.

3. Implement policies and strategies that make more of the fixed costs of driving into variable costs related to VMT and emissions. Possibilities include CO_2-based registration fees, a VMT tax, congestion pricing, and a fuel tax.

[19] David Anderson and Gerard McCullough, *The Full Cost of Transportation in the Twin Cities Region*," TRG Report No. 5, Center for Transportation Studies, University of Minnesota, August 2000, available at: http://www.cts.umn.edu/trg/research/reports/TRG_05.html

4. Use new revenue streams for less GHG-intensive travel options (e.g., public transit, vanpooling, commuter benefits, and commuter options).

In all cases, the state should design and implement policies with an explicit consideration of equity impacts on both low-income and rural drivers.

Goals: For PAYD insurance, assume market penetration of 25% in 2015 and 50% in 2025.

Timing: Passage of a comprehensive transportation funding package with some or all of these strategies during the 2008 legislative session, effective July 1, 2008.

Parties involved: Highway and transit users; automobile manufacturers and retailers; insurance companies, Minnesota state Departments of Commerce, Public Safety, Revenue, Finance, and Pollution Control; MC, MnDOT.

Other:

1. Increasing the price of driving reduces the number of miles driven and can be accomplished in a variety of ways. Among the possible strategies is increasing the gas tax, which is likely to both reduce the number of miles driven and provide additional transportation revenue to the state. The TWG discussed various issues raised by a gas tax increase, including the economic and personal impact of higher taxes and the constitutional issues that exist around the use of gas tax revenues. In light of these issues and concerns expressed by the current administration, the TWG is making no recommendation on the gas tax to the MCCAG. However, the group believes the MCCAG should seriously consider financial strategies that would make the full (including environmental) cost of driving more apparent to drivers.

2. Significant policy innovation and development are occurring in this area. In the future, additional options may exist that would accomplish the goals of reducing VMT and providing additional revenues to support lower GHG transportation options, including transit. The fact that these ideas, such as cordon pricing, are not analyzed here means only that they are not yet ripe for analysis, not that they are without merit.

Implementation Mechanisms

Increase the Consumer Cost of Driving

Increasing the cost of automobile use can reduce fuel consumption and travel while encouraging the use of alternative fuels and public transit.

Encourage the Purchase of Low-GHG Vehicles

The state could adopt a variety of programs to increase purchase of fuel-efficient or low-GHG vehicles (including pure electric, hybrid, plug-in hybrid, and other alternative-fuel vehicles). State incentives could include lower registration fees, feebates, and/or tax credits. Higher vehicle registration fees could be charged for vehicles that have lower fuel economy and higher GHG emissions. Vehicle licensing fees could be based upon vehicle weight and/or emissions, for example, with use of a dollar per vehicle-ton multiplier instead of the present broad categories of vehicle weight.

Support PAYD Automobile Insurance

The state would encourage and support the provision of PAYD auto insurance, possibly including state support for additional pilot programs. This would also require the state Insurance Commission to conduct an active review of possibilities.

Related Policies/Programs in Place

MnDOT pilot underway to test VMT fees (no results are yet available), and PAYD insurance.

GMAC and OnStar Low-Mileage Discount Rates[20]

Since mid-2004, the General Motors Acceptance Corporation Insurance has offered mileage-based discounts to OnStar subscribers located in certain states. The system automatically reports vehicle odometer reading at the beginning and end of the policy term to verify vehicle mileage. Motorist who drive less than the specified annual mileage receive insurance premium discounts of up to 40%:

1–2,500 miles:	40% discount
2,501–5,000 miles:	33% discount
5,001–7,500 miles:	28% discount
7,501–10,000 miles:	20% discount
10,001–12,500 miles:	11% discount
12,501–15,000 miles:	5% discount
15,001–99,999 miles:	0% discount

This Federal Highway Administration's Value Pricing Pilot Program[21] is now providing funding for PAYD insurance simulation projects in Georgia and Massachusetts.

Distance-Based Program

Progressive Insurance[22] offers distance-based insurance in Oregon, Michigan, and Minnesota. The program uses Global Positioning System technology to track vehicle location and use.

TripSense(SM)

In August 2004, the Progressive Direct Group of Insurance Companies introduced TripSense, a usage-based auto insurance discount. The group notes:

> "Safer drivers and people who drive less than average should pay less for auto insurance. That's why we created the revolutionary TripSense(SM) discount program, which measures your actual driving habits and allows you to earn discounts on your insurance by showing us how much, how fast and what times of day you drive. TripSense gives you more control over what you pay for insurance, as your driving habits determine your discount."[23]

---

[20] See http://www.onstar.com/us_english/jsp/low_mileage_discount.jsp.

[21] See http://www.fhwa.dot.gov/policy/13-hmpg.htm.

[22] See http://www.progressive.com.

[23] See http://newsroom.progressive.com/press-kit/tripsense-images.aspx.

Type(s) of GHG Reductions

Primarily CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources:

The Arizona Public Research Interest Group (PIRG) Education Fund analyzed the potential GHG savings from a PAYD automobile insurance policy. The strategy for a PAYD policy analyzed assumes that insurers are required to offer mileage-based insurance for certain elements of vehicle insurance, including collision and liability. The Arizona PIRG Education Fund assumes the PAYD policy is required and phased in over time, and that all drivers in Arizona are eventually covered.

To calculate GHG savings, the Arizona PIRG Education Fund converted Arizona state automobile collision and liability insurance expenditures to an insurance cost per mile ($.064/mile). If insurance consumers pay 80% of their collision and liability insurance on a per-mile basis, then drivers would be assessed about a $.051/per mile. This per-mile insurance charge would reduce VMT by about 8%.[24] (To put this charge in context, at 20 mpg, $.051/mile = ~$1/gallon of gasoline.)

The TLU TWG compared the Arizona PIRG Education Fund results for estimated reductions in VMT with other studies of PAYD policies, including those produced by the Economic Policy Institute and Resources for the Future. The TWG found that the Arizona PIRG estimates were comparable with other estimates, which ranged from 8% to 20%, and used the 8% estimate.

Quantification Methods:

Impacts

Pilot studies and empirical experience with other marginal costs of use find that PAYD can reduce VMT by between 8% and 20%. If phase in/ramp up, then:

Apply reductions to light-duty vehicle (LDV) VMT only:

- 2015 reduction = statewide LDV × 4% reduction.
- 2015–2025 reduction = statewide LDV × 8% reduction.
- Convert to CO_2.

Net Present Value/Cost-Effectiveness

The success of the Progressive Insurance pilot in Texas suggests that there is an unmet demand for more choice in auto insurance. If PAYD improves and increases consumer choice, and also allows insurance providers to more efficiently align risks and premiums, economic efficiency will increase.

[24] Elizabeth Ridlington and Diane E. Brown, *A Blueprint for Action: Policy Options To Reduce Arizona's Contribution to Global Warming*, Arizona Public Research Interest Group Education Fund, April 2006, pp. 25-26, available at: http://www.arizonapirg.org/AZ.asp?id2=23683. See also: http://www.serconline.org/payd/links.html, which links to a wide variety of PAYD studies and materials.

Key Assumptions:

State regulation of the Minnesota automobile insurance industry requires insurance companies to offer PAYD insurance, and eventual application of PAYD insurance to 50% of the LDV fleet.

Key Uncertainties

The specifics of the PAYD insurance programs are to be determined.

Until there is broader implementation beyond the current pilot programs, the effects of PAYD insurance on driver behavior are subject to significant uncertainty.

Until there is broader implementation beyond the current pilot programs, the economic impacts on insurance companies are unclear. A common question is, "If distance-based pricing is better, why do insurance companies not offer it without a mandate?"

In general, as has been demonstrated repeatedly in other consumer sectors, individual firms may innovate and not be followed by other firms for a wide variety of reasons, but when the market is transformed through policy changes, the industry adapts and remains healthy. Specifically regarding vehicle insurance:

> "Individual insurers face several barriers to implementing distance-based pricing. An individual company faces relatively high administration costs to establish an odometer auditing system. Insurance regulators are often unsupportive of pricing innovations. An individual insurance company only captures a small portion of the total benefits, since most financial savings are passed back to customers or accrue to competitors. Insurers do not profit from reductions in uncompensated crash costs, congestion, infrastructure costs, or pollution, or benefit directly from increased equity.
>
> "Insurance companies currently maximize profits by maximizing their gross revenue, because they are dependent on investment income. A pricing strategy that reduces total crashes could reduce profits if regulators or market competition required a comparable reduction in premiums. Although there are potential financial and marketing benefits, these longer-term savings would have to offset an individual insurer's short-term revenue losses and risks. It is therefore not surprising that few insurers have implemented distance-based pricing."[25]

Additional Benefits and Costs

Equity Impacts

Proponents argue that PAYD improves equity and fairness:

> "Current vehicle insurance pricing significantly overcharges motorists who drive their vehicles less than average each year, and undercharges those who drive more than average within each price class. Since lower-income motorists drive their vehicles significantly less on average than higher-income motorists, this is regressive. Distance-based insurance is fairer than current pricing because prices more accurately reflect insurance costs.
>
> "Distance-based pricing benefits lower-income drivers who otherwise might be unable to afford vehicle insurance, and who place a high value on the opportunity to save money by reducing vehicle mileage. It

[25] Todd Litman, "Pay-As-You-Drive Vehicle Insurance: Converting Vehicle Insurance Premiums Into Use-Based Charges," in *TDM Encyclopedia*, Victoria Transport Policy Institute, March 2007, available at: http://www.vtpi.org/tdm/tdm79.htm.

> benefits lower-income communities that currently have high, unaffordable insurance rates…. Distance-based insurance would provide significant savings to workers during periods of unemployment, when they no longer need to commute."[26]

Other equity issues may be addressed through policy design.

Feasibility Issues

None cited.

Status of Group Approval

Approved

Level of Group Support

Supermajority

Barriers to Consensus

Some MCCAG members viewed pricing of any amount as essentially punitive.

[26] Litman, *ibid*. This article discusses a wide variety of questions about PAYD in some detail, and provides additional references.

TLU-6. Adopt California Clean Car Standards

Policy Description

This policy option reduces GHG emissions from new motor vehicles (cars and light-duty trucks) sold in Minnesota 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 GHG emissions from new cars and light-duty trucks sold in that state beginning with model year 2009. California plans an 8-year phase-in. The California standards incorporate the main global warming gases (i.e., CO_2, CH_4, and N_2O) resulting directly from the operation of the vehicle (tailpipe emissions), as well as hydrofluorocarbon (HFC) emissions resulting from leakage from or operation of the air conditioning system.

Policy Design

Goals: Adopt the California Clean Car program.

Timing: If adopted, the standards would take effect no earlier than the 2011 model year and would be phased in over a specified period of time (assuming the legislature would act in 2008).

Parties Involved: State legislature, Minnesota auto dealers.

Other: None.

Implementation Mechanisms

Adopt via legislation.

Current Legal Situation
The Clean Air Act allows California to establish its own vehicle emission standards, and to implement them after receiving a waiver from the EPA. Other states may then adopt the California standards. In December 2007, EPA denied California's waiver request. On January 2, 2008, California and 15 other states sued to have the EPA decision overturned.[27] Minnesota has since joined the lawsuit.

Given this situation, at least two possibilities for moving forward on this policy option present themselves:

[27]"Besides Maryland and New York, the other states and agencies that joined the suit are Massachusetts, Arizona, Connecticut, Delaware, Illinois, Maine, New Jersey, New Mexico, Oregon, the Pennsylvania Department of Environmental Protection, Rhode Island, Vermont and Washington." From Keith B. Richburg, "California Sues EPA Over Emissions Rules: 15 Other States Back Effort To Win Waiver To Allow the Setting of Tougher Standards," *Washington Post*, January 3, 2008; page A02, available at: http://www.washingtonpost.com/wp-dyn/content/article/2008/01/02/AR2008010202833.html.

1. Minnesota could adopt the California standards and join the other states in awaiting the outcome of the current lawsuit.

2. Minnesota could use the time during which the lawsuits are argued to examine the issue in more detail via a legislative and/or Governor's Task Force.

Related Policies/Programs in Place

Since California's adoption of the Clean Car Standards, 12 additional states have adopted its standards.[28]

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

The Energy Independence and Security Act of 2007[29] established a 35-mpg corporate average fuel economy (CAFE) standard for cars and light-duty trucks—that is, a 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 H-3).

Table H-3. 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[30]	35 mpg

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

[28] 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.

[29] See http://www.whitehouse.gov/infocus/energy/

[30] 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."

Type of Standard

When calculating GHG emissions per vehicle per mile, California Clean Car takes into account GHG emission reductions from the air-conditioning system as well as the tailpipe, and tailpipe calculations can take into account different fuel types. The following information is from the California Attorney General's comparison of the California standards and the new CAFE standard:[31]

GHG Emission Reductions from Air Conditioning

Analysis by California suggests that substantial, speedy reductions in GHG emissions per vehicle are available from further controlling air-conditioner emissions:

> "The California GHG standards establish a credit scheme for air conditioning improvements. These improvements include hoses and connections that leak less, refrigerants with less global warming potential, and more efficient systems. We expect most manufacturers to take advantage of these air conditioning credits, given the state of technology and the low costs involved. The credits can be as much as 18.5 CO2-e grams per mile (g/mi) per vehicle. This is the equivalent of between 1 and 3 mpg, with it being more significant with more fuel efficient vehicles. As an example, a manufacturer that meets the California model year 2014 standards through other improvements can meet the model year 2016 standards just by adding air conditioning improvements."

GHG Emission Reductions from Alternative Fuel Use

> "The California GHG standards also provide credits for the use of alternative fuels. These include ethanol (E85), natural gas, electricity (including plug-ins), and hydrogen. These credits are based on the lifecycle emissions of the fuels, to take into account upstream emissions, and will be calculated based on certification data that the manufacturers provide (as a matter of course) to the California Air Resources Board. Different fuels have different greenhouse gas emissions, even holding fuel economy constant. Because of this, the greenhouse gas "footprint" of cars does not necessarily match their fuel efficiency.
>
> "These alternative fuel credits have great potential. For example, for every vehicle run exclusively on corn-based E85, automobile manufacturers will receive a credit of 26% of that vehicle's tailpipe emissions due to the significantly lower upstream emissions from growing and producing corn-based ethanol (the credit would be even higher if the source of the ethanol were to change to cellulosic or sugarcane). For a car run exclusively on electricity (and with zero tailpipe emissions), the regulation sets the emissions at 130 CO_2e g/mi (to account for greenhouse gases in producing the needed electricity), well below the fleet-average standard for model year 2016."

Both California and CAFE set up various arrangements for trading credits, which also add flexibility.

Type(s) of GHG Reductions

CO_2, CH_4, and N_2O resulting directly from the operation of the vehicle (tailpipe emissions).

HFC emissions 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 George W. Bush, now becomes part of the Minnesota baseline. Because the California Clean Car standards reach *higher* mpg-

[31] Ibid.

equivalencies *sooner*, they would produce additional GHG emissions reductions in the MCCAG timeframe 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.

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 Minnesota, in addition to the impact of the new CAFE standard of 35 mpg.

Policy No.	Policy Recommendation	GHG Reductions* ($MMtCO_2e$)		
		2015	2025	Total 2008–2025
TLU-6	Adopt California Clean Car Standards	0.74	1.16	13.10

This analysis is based on a document recently released by 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 fleetwide 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 U.S. 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 Minnesota, and judges CARB's methodology to be a sound comparison of the two standards for California's LDV (light-duty vehicles) fleet. For Minnesota, we use available data on the national fleet. We are not aware of any detailed data on vehicle population and activity rates for the Minnesota 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-6. Beginning implementation with the 2011 model year rather than 2009, Minnesota 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 (EPA vehicle emission modeling software) 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 two policy scenarios:

   a. CAFE only, and

   b. CAFE + California Clean Car standards.

4. For each calendar year, calculate emissions from vehicles in each model year under the two policy scenarios.

5. For each calendar year, calculate total LDV emissions under the two policy scenarios.

Table H-4 compares emission reductions from light-duty vehicles in Minnesota under each of the three scenarios to baseline emissions.

Table H-4. Comparison of emission reductions

Emission Reductions ($MMtCO_2e$)	2015	2025	2008–2025
New CAFE standards	1.32	6.02	43.51
California Clean Car Standards	1.57	5.67	44.20
CAFE + California Clean Car	2.06	7.18	56.62

Key Assumptions:

- New LDVs in Minnesota will be 50% passenger cars and small trucks and 50% large trucks and SUVs. This assumption is consistent with CARB's assumption for the federal 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 Minnesota's fleet of LDVs.

Data Sources:

- Default values for fleet population and activity by vehicle age from EPA's MOBILE6 model.
- VMT projections from the Minnesota 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 Reponses 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: www.arb.ca.gov/cc/ccms/ab1493_v_cafe_study.pdf.
- Energy Independence and Security Act of 2007, HR6.
- 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.

Costs/Savings Summary

Before the establishment of the new CAFE standard, CARB estimated that the ultimate GHG standards 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.

In addition, before the establishment of the new CAFE standard, the auto industry estimated the average cost per vehicle would be $3,000 for complying with the new CAFE requirements, and that the fuel savings would not offset that higher cost. The auto industry estimated that the higher initial cost would delay the turnover of the fleet to cleaner, safer vehicles.

These figures remain the same under the new CAFE standard, but a portion of those costs will be incurred under the new baseline. Isolating the cost of the additional California reductions would require an analysis of auto industry cost curves, beyond the scope of this analysis.

As noted above, California believes that its inclusion of credits from air-conditioning measures increases manufacturer freedom and thus reduces costs relative to a tailpipe-only approach.

Data Sources/Quantification Methods/Key Assumptions

Issue: CARB and automakers disagree on the cost of compliance with California Clean Car standards. As described above, CARB estimates that the additional cost of compliance for a new car in model year 2016 would be approximately $1,000 and that the net benefit to consumers, accounting for reduced fuel consumption, would be slightly positive. Automakers contended that the price would be in the vicinity of $3,000 and that the net benefit to consumers would be negative.

CARB's cost estimates were based on existing and emerging technologies that can improve fuel economy in passenger vehicles. CARB included a number of conservative elements in its methodology:

- Standards were based on the heaviest manufacturer fleet.
- Multiple feasible technology packages were ensured for each vehicle class.
- Emission reductions from hybridization were excluded.
- Fuel price was assumed to be $1.74 per gallon.[32]

CARB's analysis estimated that the additional cost of compliance in a new vehicle in model year 2016 will be approximately $1,000. To determine the net impact on consumers, CARB calculated the increase in monthly loan payments versus the savings from reduced fuel consumption. Consumers would achieve a net savings of approximately $3.50–$7.00/month.

An analysis by Sierra Research, Inc., commissioned by the Alliance of Automobile Manufacturers, estimated that the average cost of compliance with AB 1493 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

[32] CARB, ARB Staff Reponses 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, page 1.

in sport luxury cars. Such structures are not feasible for use in typical passenger vehicles. In addition, AB1493 prohibits the use of such weight-reduction approaches.[33]

Finally, the Sierra analysis appears internally inconsistent. If consumers do not see net savings from the purchase of a California Clean Car, then there is no extra money for them to spend on additional driving.[34] The CARB analysis acknowledges the rebound effect from its savings, but does not expect (nor does any study of the rebound effect find) that consumers would use up all their savings in additional driving.

Getting away from the debate over CARB analyses, several academic studies of likely California standard costs also find net consumer saving. For example, Table H-5 shows the results of a University of Michigan study.[35]

Table H-5. Vehicle lifetime savings to consumers with Pavley auto standards

Cost Factors	Car	Van	Pickup	SUV	Market
Lifetime fuel cost	–$2,432	–$3,090	–$3,712	–$3,786	–$2,928
Retail price	$1,253	$989	$1,367	$1,242	$1,275
Total change (savings)	–$1,178	–$2,100	–$2,344	–$2,544	–$1,652

There is substantial empirical basis to expect that both CARB and the industry have overestimated compliance costs. A review by the Natural Resources Defense Council found that the auto industry has typically overestimated the compliance costs of pollution standards for passenger vehicles by a multiple of between 2 and 10. Factors that contribute to overestimation include unanticipated innovation and overly conservative estimates. Regulators have also overestimated compliance costs in the past, by a factor of as much as 2.[36]

The question of how much higher initial costs affect vehicle turnover is likewise the subject of extensive study and debate. Auto manufacturers generally argue—and various researchers, including Sierra Research, find—that higher prices slow turnover, to the detriment of the goal being sought through regulation. (This is a problem in no way limited to auto regulations.) On the other side, research exemplified by that done at the University of California, Davis argues that it is difficult to find an empirical basis for claims that past fuel economy (or safety) regulations have meaningfully slowed fleet turnover.[37]

---

[33] 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.

[34] See Meszler Engineering Services, "Response to Sierra Massachusetts Pavley Comments, November 22, 2005, available at: http://www.mass.gov/dep/air/laws/meszler.pdf.

[35] Walter S. Mcmanus, "Economic Analysis of Feebates to Reduce Greenhouse Gas Emissions from Light Vehicles for California," University of Michigan Transportation Research Institute, Ann Arbor, Michigan, UMTRI-2007-19-2, May 2007. http://www.umtri.umich.edu/content/UMTRI-2007-19-2.pdf

[36] 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, page 6.

[37] A recent example is 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,

Conclusion

With the passage of the new federal CAFE, all of these analyses are now out-of-date. 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 CAFE 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, which is beyond the scope of this analysis. Such an analysis might find either positive or negative net costs for consumers.

In any case, the cost of new CAFE + California Clean Car cannot exceed the cost of California Clean Car on its own. Although it is possible that the CARB cost estimates of compliance are too low, the TLU TWG believes the CARB analysis is more thorough and overall more credible. Therefore, we continue to show cost savings for CAFE + California Clean Car.

Cost summary

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 CO_2e reduced at the high end, and roughly one-third of that (~$39 saved for each ton) at the low end. The TWG used the low end of that range, $39 saved per ton reduced.

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.

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.[38, 39]

Additional Benefits and Costs

Reducing the total amount of on-road fuel burned in Minnesota would, all else being equal, reduce emissions of ground-level pollution, with accompanying reductions in health impacts.

A joint study conducted in 2007 by NERA Economic Consulting, Sierra, and Air Improvement Resource (NERA/Sierra/AIR) concluded that California's low-emission vehicle (LEV) program results in higher levels of a variety of pollutants, including exhaust fine particulate matter

---

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.

[38] See http://www.vtd.uscourts.gov/Supporting%20Files/Cases/05cv302.pdf

[39] The December 11th 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

($PM_{2.5}$), NOx, volatile organic compounds, carbon monoxide, and air toxics.[40] The study evaluated the emission impacts of the entire California LEV program—criteria emissions, the zero-emissions vehicle (ZEV) mandate, and the GHG provision—on new LDVs in California, and compared them with those that would occur in the state under the federal vehicle emission standards. The key to the study's results is that "the new vehicle price increases resulting from the ZEV and GHG standards will affect fleet turnover by reducing new vehicle sales and inducing higher rates of retention of older, higher-emitting vehicles. These effects lead to increases in criteria pollutant emissions, as older vehicles in the fleet often have emission rates that are many times higher than those of new vehicles."

Although the set of regulations covered in the NERA/Sierra/AIR study is broader than just the California GHG regulations, the basic question is the same as discussed above under "Costs/Savings": Do higher initial prices slow turnover to the extent that the regulatory goal sought in the new fleet is reversed? While the TLU TWG has not reviewed the entire literature on this subject, of those cited here, it finds the CARB and other studies finding "no" to be stronger overall for the reasons given above.

Feasibility Issues

Manufacturers have stated under oath that they cannot meet the California GHG standards using their current mix of models. They would attempt to comply by severely restricting model availability.

There is some concern that California standards may constrain the sale of E85 vehicles. This is due to the partial ZEV standard and the testing on worst-case blend of fuel (E10). It may require switching back to metal fuel tanks, which add weight and packaging issues. Also, super-ultra-LEV tailpipe emissions are difficult at cold temperatures required by CARB, because hydrocarbon emissions exceed the standard before the catalyst is warmed up. This claim is disputed by the Union of Concerned Scientists which, through its Vanguard program, has designed a full range of vehicle types that meet the California standards and run on E85 (see www.ucsusa.org/clean_vehicles/vehicles_health/ucs-vanguard.html). The fact that California Clean Car gives credit for E85 vehicles also suggests that this is unlikely to be a major barrier.

Status of Group Approval

Approved

Level of Group Support

Majority

Barriers to Consensus

The discussion above was produced through work by members of the TLU TWG. It would be incorrect to characterize any part of it as a consensus on the part of the TWG. The following two

[40] NERA/Sierra/AIR, "Effectiveness of the California Light Duty Vehicle Regulations as Compared to Federal Regulations," June 15, 2007. So far as the Center for Climate Strategies (CCS) knows, this study is not available online. CCS will e-mail it to any interested reader.

sections are statements by two individual TLU TWG members are provided in an effort to capture the sources of disagreement about this option.

SCOTT LAMBERT

Representatives of the automobile industry participating on the Transportation and Land Use (TLU) Technical Work Group (TWG) strongly oppose the inclusion of California's low-emission vehicle (LEV) standard (CA LEV) as a recommendation in the MCCAG's final report.

CA LEV is a program designed by California legislators and regulators—none of whom is accountable to Minnesota or its residents. By adopting CA LEV, Minnesota is ceding its authority to a state that is vastly different and tying itself to all future regulatory changes that California makes. Divergent market trends, economic drivers, natural resources, and air quality concerns separate Minnesota and California. Adoption of CA LEV will lead to repercussions not only in the automobile industry, but also in the agriculture, tourism, mining, forestry, construction, ethanol, and many other industries.

In the wake of recent federal activity pertaining to both state and national fuel economy standards, TLU-6 does not align with MCCAG's stated goal of reducing GHG emissions in the state and should not be included in the final report.

Recent Developments

In December 2007, the Renewable Fuels, Consumer Protection, and Energy Efficiency Act (H.R. 6) was signed into law. This legislation's centerpiece was an unprecedented increase in Corporate Average Fuel Economy (CAFE) standards. Not only is H.R. 6 historic because it is the first increase in fuel economy standards by Congress since 1975, but it *requires a dramatic 40% increase in mileage standards* by 2020.

This comprehensive and aggressive response to the climate change issue will result in a *30% reduction in CO_2 emissions from individual vehicles* by 2020. These new standards present one of the biggest challenges in the automobile industry's history, and will require automakers to continue creating, developing, and introducing cutting-edge, fuel-efficient vehicles.

Not only will H.R. 6 provide significant reductions in CO_2 emissions, but it will also reduce our nation's dependence on foreign oil and increase the production of clean and alternative fuels. H.R. 6 is estimated to *save 18 billion gallons of gasoline per year* by 2020, as compared with projected consumption levels—the equivalent of taking 30 million cars off the road. In addition, the legislation will *reduce oil consumption by 1.1 million barrels a day* in 2020, compared with projected consumption levels and *require that the United States produce 21 billion gallons of advanced biofuels.*

With the federal government's adoption of H.R. 6, the U.S. Environmental Protection Agency showed its support for a strong national program by denying California's request for a waiver to implement its own fuel economy regulations (AB 1493) as part of the preexisting CA LEV standards. This action prohibits California and all other states from implementing CA LEV's proposed fuel economy regulations. While this decision is being appealed by California and several other states, current law does not allow for the implementation of AB 1493.

In the wake of the waiver denial, states that have adopted or plan to adopt the CA LEV program are only adopting a smog- and ozone-forming emissions program that provides no environmental benefit above and beyond the existing federal program. *However, in adopting the CA LEV criteria-forming emission standards, states are effectively ceding their authority to unelected California regulators.*

The new CAFE law applies a high standard to all 50 states that is good for both consumers and energy security. The auto industry believes that states can also address the climate change issue —as it relates to the transportation sector—by supplementing the federal government's work and incentivizing the purchase and use of alternative-fuel and advanced-technology vehicles.

Comparison

Proponents of TLU-6 may point to the California Environmental Protection Agency's Air Resources Board's (CARB's) analysis comparing H.R. 6 and AB 1493. CARB's effort is flawed, largely due to the fact it compares an existing regulation (CA LEV) to a piece of legislation (H.R. 6) that is a regulatory scheme has yet to be created. In addition, CARB also attempts to compare H.R. 6 in 2020 to "Phase 2" of California's fuel economy program. With "Phase 1" of California yet to be implemented, CARB cannot possibly predict how or when "Phase 2" of its regulation will take effect. *The analysis is using non-existent regulations from California's program to diminish H.R. 6, a tactic that is not reliable or credible.*

What we do know is that the requirements in H.R. 6 will be a challenge for auto manufacturers, since they represent an approximate 4% increase in fuel economy annually. Automakers will continue to create, develop, and introduce cutting-edge, fuel-efficient technologies in order to reach the 35-mpg standard by 2020. Comparatively, the California standards require up to a 14% improvement in fuel economy in just one year—an improvement that is technically infeasible absent product restrictions.

In addition, we know CA LEV's fuel economy standards will have a significant impact on Minnesota consumers, as explained below.

Facts About CA LEV

- A recent study by a team of experts from Sierra Research, Air Improvement Research, Inc., and NERA Consulting concluded that the implementation of CA LEV in its entirety—including the fuel economy standards—results in higher levels of a variety of pollutants, including exhaust $PM_{2.5}$, NO_x, volatile organic compounds, carbon monoxide, and air toxics. Why?
    - "Fleet Turnover Effect"—As vehicle prices increase as a result of added regulation, older vehicles, with less productive pollution controls than their newer counterparts, remain on the road longer.
    - "Rebound Effect"—As vehicle fuel economy increases, the cost of driving declines and vehicle operation increases.
- In litigation over the greenhouse gas standards, large-volume manufacturers stated under oath that compliance with the regulation is not technically feasible, absent product restrictions.

- Significant reductions in vehicle choice will disproportionately impact Minnesota because of its unique market.
- Minnesotans favor light-duty trucks and sport utility vehicles (SUVs), with a sales mix of approximately 55% trucks and 45% passenger cars. This is not surprising, given that Minnesota's economy is largely based on agriculture, tourism, mining and forestry, and construction.
- In comparison, California—the state that designed the program and will retain control over the regulation—has a sales mix of approximately 49% trucks and 51% passenger cars.
- *Consumer choice, specifically in reference to the availability of light-duty trucks and SUVs that Minnesota residents like to drive, will be severely limited.*

- Expert economists have predicted that consumers can expect to see an average increase of at least $3,000 in the cost of new vehicles sold in Minnesota.
  - Adoption of CA LEV will not support Minnesota's commitment to E85 technology and infrastructure.
  - Automobile manufacturers get no credit toward their CO_2 fleet averages for producing or selling E85 vehicles under the California program.
  - An expert retained by California to testify on the issue of alternative fuels stated, under oath, that it would not be prudent for vehicle manufacturers to rely on the sale of E85 vehicles to generate sufficient credits to comply with the greenhouse gas standards proposed in the CA LEV program.
  - California standards may constrain the sale of E85 vehicles. About 40% of all new vehicles are required to meet partial zero emission vehicle (PZEV) standards. *However, no E85 vehicle has EVER met the PZEV standard, nor has CARB demonstrated that it's even possible to meet the PZEV standard with an E85 vehicle.* Thus, CA LEV immediately eliminates about 40% of the E85 market.

JIM ERKEL

California Clean Car Standards versus New CAFE Standards

1. **The California clean car standards are not precluded by new CAFE standards.** As part of the Clean Air Act, California is allowed to set its own emission standards subject to EPA granting a waiver from the application of its national standards. Other states may adopt California's standards without the need for approval from EPA. The main argument of automobile manufacturers has been that the California clean car standards are the functional equivalent of a fuel economy standard and should be preempted or precluded by the CAFE standards adopted by the National Highway Traffic Safety Administration (NHTSA) under the Energy Policy and Conservation Act (EPCA). However, The U.S. Supreme Court recently held that greenhouse gases are pollutants within the meaning of the Clean Air Act. The Supreme Court stated that the possibility of overlap between EPA's authority under the Clean Air Act and NHTSA's authority under EPCA did not bar EPA from having to deal with carbon dioxide as a cause of air pollution. In addition, the U.S. District Court for the Eastern District of California recently held that, in dealing with the possibility of overlap, EPA need not defer to NHTSA, but rather that NHTSA must take into consideration EPA's standards in setting its CAFE standards. As Congress considered higher fuel economy

standards as part of the new energy bill, the Energy Independence and Security Act of 2007 (EISA), manufacturers lobbied to include language to require that EPA defer to NHTSA's standards. Instead, language was included at the request of California and a number of other states to make certain that EISA did not limit, alter, or modify other environmental laws and regulations, including the Clean Air Act. As a result, the new CAFE standards established in EISA do not change EPA's preferential position under the Clean Air Act for California's ability to set its own standards and waive out of EPA's standards, or the ability of states to adopt California's standards.

2. **The California standards will not establish a patchwork of regulation.** A related argument asserted by the automobile manufacturers is that allowing California to set standards and then letting other states adopt them would establish an unworkable national patchwork. This is not true. Under the Clean Air Act, there are only two possible standards—EPA's standards or California's standards for which waivers have been granted. If another state adopts California's standards, manufacturers will be able to sell the automobiles they are already making for California. In addition, the argument that a patchwork might develop fails to acknowledge that many states already apply California's non-greenhouse gas standards, and there is no suggestion it has been difficult for manufacturers to work out the shipment of vehicles between adopting and non-adopting states.

3. **The new CAFE standards are not sufficient.** James Hansen, one of the nation's top scientists studying climate change, recently suggested that the safe upper limit for atmospheric carbon dioxide may be 350 parts per million, rather than the 450 parts per million that most have assumed. He also noted that the world already stands at 383 parts per million. As a result, it is critical that we immediately begin taking steps to reduce greenhouse gas emissions. The California Air Resources Board (CARB) has estimated that its standards will reduce greenhouse gases more than the new CAFE standards. The new CAFE standards ramp up fuel economy for passenger cars from today's 27.5 miles per gallon to 35 miles per gallon in 2020. In contrast, the clean car standards ramp up between 2009 and 2016 and attain higher rates of emission reductions. The clean car standards will prevent the emission of 58 $MMtCO_2$-e in California between 2009 and 2016, more than three times the 20 $MMtCO_2$-e if only the new CAFE standards are applied. California is already committed to establishing a second round of standards that would take effect between 2016 and 2020. Taking these second-round standards into account, the clean car standards would prevent 167 $MMtCO_2$-e in California by 2020, which is more than twice the 76 $MMtCO_2$-e if only the new CAFE standards are applied. Given the effects of climate change that it confronts, Minnesota should take advantage of the benefits of the quicker ramp-up and higher reduction potential that would be afforded by adopting California's clean car standards.

4. **The automobile manufacturers can meet the California clean car standards.** The manufacturers have argued that the lead time to go from concept to production means that they can't meet California's clean car standards. In considering its standards, though, CARB identified existing technologies already being used in automobiles that would be sufficient in the near term. In fact, the Director of Communications for the Alliance of Automobile Manufacturers acknowledged that "[e]ighty percent of the technology [CARB] . . . identified is currently available on cars and light trucks…. California's rules could aim for 30 percent emissions cut." (*San Diego Union Tribune*, June 9, 2004). In addition, California's standards

provide several opportunities for flexibility that do not exist in the new CAFE standards. For example, California sets different emission rates for cars and trucks and allows credits to be traded between them, establishes credits for the use of alternative fuels, including E85, and sets up a credit scheme for air conditioning improvements. The California Attorney General has noted that assuming fuel economy of 35 miles per gallon and full use of the air conditioning credits, gasoline-powered vehicles would meet California's standard in 2012 and would need only an additional 12% reduction to meet the standard for 2016.

5. **The cost of meeting the California Clean Car standards will not be substantial.** In considering the clean car standards, CARB estimated the added cost per vehicle of meeting the standards would be about $375 in the short term, and as fully phased in the mid-term would be about $1,000. In contrast, the manufacturers argued that the cost would be more than $3,000. A study of CARB's previous technology-forcing regulations shows that the actual costs of control imposed by its regulations have been lower than CARB's estimates, and in some cases only a tenth of manufacturers' estimates. In addition, CARB found that the additional vehicle cost would be more than offset by savings in operating costs. Assuming a gas price of $1.74 per gallon, CARB estimated that for every $1 of cost resulting from the standards, consumers would save between $5 and $11. The Union of Concerned Scientists estimated that at a gas price of $2 per gallon, the cost of the technologies to meet the clean car standards would pay for themselves in less than a year and a half of average driving.

6. **Buyers are already expressing a preference for more fuel-efficient vehicles.** The manufacturers have argued that buyers have preferred larger, heavier vehicles and this preference will not change. As a result, they have claimed that the clean car standards might force them to withdraw some vehicles from the market. In fact, much of the testimony presented by manufacturers in a 16-day trial on these issues in U.S. District Court for Vermont assumed that vehicle weights would continue increasing and that buyer preferences will not change from the 2004 model mix. The District Court dismissed the manufacturers' claims as "unconvincing," "improbable," "highly unlikely," and "not credible." The District Court noted that Chrysler Group posted a loss for 2006 of $1.4 billion and stated the loss was due in part to a shift in consumer demand for better fuel economy and smaller vehicles. The District Court pointed out that Chrysler's plan to recover from this loss included a new focus on fuel-efficient vehicles. The recent release of 2007 vehicle sales information substantiates the District Court's conclusion. A recent article from *Auto Observer* notes that Toyota passed Ford as the No. 2 automaker in the United States, and highlighted the fact that 2007 sales of Toyota's Prius hybrid increased by 68.9%, outselling several full-line brands. In fact, the Prius outsold every Ford vehicle, except the F-Series pickup truck.

7. **The California Clean Car standards will not increase other vehicle-based air pollution.** The manufacturers have argued that the adoption of California's clean car standards will have the effect of increasing of other vehicle-based air pollution. This argument is based on the manufacturers' assumption that buyer preferences will not change. The manufacturers argue that the lack of technological solutions for meeting the standards means that they may have to withdraw some vehicles from the market, and the technological solutions that do exist will add substantially to the cost of each vehicle. Because of this, manufacturers claim that buyers will postpone buying cleaner new vehicles and will increase their driving due to the lower cost of operating older vehicles. As already noted, though, the needed

technological solutions are already in the market, the cost of the standards will be less than the manufacturers claim, higher gas prices will mean that the cleaner new vehicles will quickly offset such costs and substantially raise the cost of operating the less efficient older vehicles, and market information shows that buyers are already moving in the direction of cleaner vehicles. As a result, the rebound effect suggested by the manufacturers is unlikely to play out as they suggest.

TLU-7. "Fix-it-First" Transportation Investment Policy and Practice

Policy Description

This policy option recommends that the state legislature require that state and federal transportation investments be prioritized in the following order: (1) maintain existing roads, and (2) design new and expanded roads to serve higher-density, more compact, pedestrian-friendly development in priority growth areas, such as downtowns, town centers, main streets, neighborhood hubs, regional centers, transit corridors, and transit station areas. It also recommends that the state significantly reduce investment in new roads and roadway expansion that accommodates and encourages both low-density development and more and longer vehicle trips.

This strategy will reduce GHGs emissions by increasing bicycling and walking and reducing the number and length of vehicle trips. (It accounts for part of the VMT reduction goal, along with TLU-1, -2, -5, -9, and -14.)

Policy Design

Goals: Place a much higher priority on maintenance of existing roads. Strategically target roadway expansion dollars as described above. Expansion projects comprise approximately 40% (approximately $600 million) of $1.6 billion in transportation investments planned for 2008–2011 in the Twin Cities metropolitan area. (See metro Transportation Improvement Plan document page 48).

Timing: Legislation drafted in 2008–2009 and adopted in 2009; changes in investments, starting in 2011 (the federally required Transportation Improvement Program document with listed projects is already in place for 2008–2011). Need legislation adopted by 2009 that identifies goals and investments policies, including targeted growth areas, implementation steps, etc.

Parties Involved: MnDOT, local government, MC, state legislature, developers, business community.

Other: None cited.

Related Policies/Programs in Place

Recent Actions in Minnesota:

The regional highway plan in the MC Transportation Policy Plan states that highway expansion investments are only considered after preservation and management investments have been funded.

Type(s) of GHG Reductions

Mostly CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

Contributes to total VMT goal; not separately analyzed.

Key Uncertainties

None cited.

Additional Benefits and Costs

Safety from improved existing infrastructure.

Feasibility Issues

None cited.

Status of Group Approval

Approved

Level of Group Support

Super Majority

Barriers to Consensus

View that MnDOT already pursues this policy.

TLU-9. Workplace Tools To Encourage Carpooling, Bicycling, and Transit Ridership

Policy Description

Reduce emissions by requiring certain employers and encouraging other employers to offer a Commuter Benefits (CB) program at the workplace to increase the use of transit, ride-sharing and non-motorized transportation. Commuter Benefits include reducing the amount of free or subsidized parking; providing paid or pre-tax transit passes or mode-neutral transportation allowances; guaranteeing rides home for non-drive-alones; providing bicycle parking and employee lockers; providing telecommuting programs; and converting employee ID cards to transit passes. In addition, reduce emissions by requiring large employers (more than 200 employees) to develop and implement transportation demand management (TDM) plans that customize commuter benefits and transit-supportive building design to specific building locations. (It accounts for part of the VMT reduction goal, along with TLU-1, -2, -5, -9, and -14.)

Policy Design

Goals:

Commuter Benefits

- All Minnesota non-rural employers with more than 200 employees located within an incorporated municipality offer CB programs.
- All colleges and universities offer CB programs.
- All government units offer CB programs, especially the state of Minnesota.
- Minnesota adopts employee parking management and incentive programs to promote alternatives to single-occupant vehicle (SOV) commuting.

Commuter Choice

- Minnesota establishes a public-private partnership to develop and run telecommuting centers that offer office-type services in locations close to commuters' residences.
- Minnesota establishes best practices in transportation demand management (TDM), and assists employers of over 200 employees in developing and implementing TDM plans. (The state is already committed to doing this in the Twin Cities metropolitan area through Metro Transit and five transportation management organizations.)

State Tax Credits for Employer-Provided Commuter Benefits

- Expand the current Minnesota Employer Transit Pass tax credit to include more employers and more commuters (e.g., nonprofit organizations and commuters who bike, carpool, or telecommute).

Timing: Implement by 2010.

Parties Involved: MC, state colleges and universities, other colleges, municipalities, transit providers, transportation management organizations, employers, state legislature.

Other: None.

Implementation Mechanisms

Expand the current Minnesota Employer Transit Pass tax credit, and establish technical assistance for employers.

Related Policies/Programs in Place

Employee Discount Transit Passes: Metro Transit offers passes for regular-route bus service for sale to employers at a 30% special discount rate for their employees to promote mass transit and reduce both congestion and emissions in the Metro area. (See http://www.metrotransit.org/groupDiscProg/metroPass.asp.)

Type(s) of GHG Reductions

Primarily CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2025 (Million $)	Cost-Effectiveness ($/tCO$_2$e)	Level of Support
		2015	2025	Total 2008–2025			
TLU-9	Workplace Tools To Encourage Carpooling, Bicycling, and Transit Ridership	0.3	0.4	4.5	Large net savings	Large net savings	UC

Data Sources:

- ICF Consulting, *Analyzing the Effectiveness of Commuter Benefits Programs*, Transit Cooperative Research Program Report 107, 2005.[41]
- ICF Consulting, *Strategies for Increasing the Effectiveness of Commuter Benefits Programs,* Transit Cooperative Research Program Report 87, 2003.[42]

Quantification Methods:

Sixty-four percent of Minnesotans work for employers with 50 or more employees. This analysis assumes that half that figure, or 32%, work in covered employers.

Key Assumptions:

GHG Impacts

After the introduction of a CB program at covered companies, transit usage increases by 25% in 2015, and 30% in 2025.

More than half of the surveys reported an increase in transit riders between 10% and 40%, and nearly one-quarter reported increases of more than 60%. Two surveys—one in San Jose in 1997

[41] See http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_107.pdf

[42] See http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_87.pdf

and one in Atlanta in 2003—suggest that transit ridership more than doubled after a transit benefits program was implemented.[43]

Table H-6. Projected percentages of commuting, VMT and workplaces/employees affected under a Minnesota Commuter Benefit program/

	2015	2025
Percentage of VMT that is commuting-related	25%	25%
Percentage of Minnesota employees affected	32%	32%
Average percentage VMT reduction per work place	25%	30%

To calculate VMT reductions, multiply baseline light-duty VMT by the above percentages. These VMT reductions are then converted to CO_2e to calculate the emissions reductions from a Minnesota CB program.

Costs

The costs of providing commuter benefits at the work place varies widely. Although contributing to employee CB financially produces the largest mode shifts, simply allowing an employee to participate in a pre-tax transit pass deduction actually saves the employer money, and generally produces almost as much mode shift. Employers also save money on parking. In a national survey of employers about why they did or did not offer commuter benefits, the main concern was not cost, but the administrative difficulty factor of adding an additional benefit.

At the IRS mileage rate of $0.49/mile, cost savings to commuters would total more than $400 million a year in 2025 (Table H-7).

Table H-7. Potential cost savings from CB program

	2015	2025
Total VMT reduction	704,913,896	993,972,902
@ $0.49/mile	$345,407,809	$487,046,721

At the University of Minnesota's *Full Cost* study rate of $0.84/mile, in 2025, total social savings from reduced VMT would be more than $800 million a year.

Since the policy option does not require a workplace contribution to a CB, only that one be offered, which can be satisfied through a no-cost pre-tax option, the TWG does not subtract employer costs from these benefits.

Because these numbers start to look very large over the time frame of the study, the TWG preferred to convey them as "large net savings."

Key Uncertainties

None cited.

[43] ICF Consulting, Analyzing the Effectiveness of Commuter Benefits Programs, p. 43.

Additional Benefits and Costs

Commute times are the most congested time of day; reductions in peak-period commuting can have substantial benefits for traffic flow and congestion relief.

Feasibility Issues

None cited.

Status of Group Approval

Approved

Level of Group Support

Unanimous

Barriers to Consensus

None

TLU-12. Voluntary Fleet Emission Reductions

Policy Description

Under this policy, Minnesota would create new services and add additional support to existing voluntary and incentive-based programs that help private fleets reduce their GHG emissions.

Approximately 10% of cars and trucks in Minnesota are in fleets. There are many ways for businesses to voluntarily reduce GHG emissions from their fleets. Typically, fleets will determine a methodology to measure their GHG impact, review their current vehicle mix and vehicle operation parameters, and then analyze options to see where efficiencies can be gained. Efficiencies generally come through improved driver behavior, more efficient vehicles (either new models or technology enhancements to existing models), and/or improved operating processes (e.g., more efficient routing systems).

This current state in private fleet efficiency programs points to certain challenges. First, there is no centralized support to help fleets manage these initiatives. Fleets have little support in selecting which metrics to measure and how to do it. Second, funding resources for retrofits and other technology-based efficiency solutions are limited and may be restricted to specific vehicle types. Part of this challenge is necessary because some solutions for heavy duty trucks are inherently different from what a fleet of sedans would be facing. Third, there is no centralized, Minnesota-based registry for businesses to post, track, and share fleet-based GHG improvements.

Policy Design

Goals: The primary goal of this policy would be to reduce the amount of total fleet generated GHG emissions by falls by 5% a year.

Levers that fleet managers can operate to mitigate the GHG impact of their fleets include:

- Managing fleet size (e.g., retiring unused vehicles),
- Right-sizing engines for business need (e.g., choosing smaller vehicles that still do the job),
- Retrofitting engines for efficiency and safety (Project Green Fleet),
- Utilizing low carbon fuels (e.g., E85, biodiesel),
- Purchasing new OEM technology (e.g., hybrid, C/LNG, propane, electric),
- Purchasing aftermarket technology (e.g., Auxiliary Power Units (APUs), Plug/Hybrid Electric Vehicle (PHEV) conversion).
- Investing in process efficiencies (e.g., driving fewer miles through route planning), and
- Promoting driver education (e.g., speeding, tire inflation).

Private fleet reductions will need to be measured in two broad categories: total fleet GHG emissions from fuel combustion and normalized GHG statistics (e.g., GHG per mile, GHG per

vehicle). This would ensure that companies whose overall emissions may be increasing due to business growth can still participate by enabling a growing fleet to operate more efficiently.

As lead-by-example, the state-owned fleet should immediately start working toward the 2025 goal of a 25% reduction of GHG emissions. (See also Cross-Cutting CC-3, State Lead-by-Example.)

Timing: Immediate; many of these projects are ongoing and will be expanded in the near future.

Parties Involved: Minnesota Environmental Initiative (Project Green Fleet and Clean Air Minnesota) and multiple public and private funders and partners; Minnesota Trucking Association; Minnesota Chamber of Commerce; Minnesota Center for Environmental Advocacy; GE Fleet Services; MPCA; EPA SmartWay Program; Hennepin County; Minnesota Regional Railroad Association; Midwest Clean Diesel Initiative; Minnesota Climate Registry.

Other: Idle reduction activities in other areas of the country have shown that drivers can safely cut idling time by approximately 15 minutes per day through the use of idle reduction techniques. Based on this information, and average fuel use data from the U.S. Environmental Protection Agency,[44] 15 minutes of idle reduction per day on 500 school buses could result in diesel fuel savings of over 11,000 gallons per year, or more than 900 gallons per month. Fuel savings can be higher when training and awareness are coupled with data logging and reporting activities.

Currently available technologies, such as anti-idle equipment, newer and more efficient locomotive engines, and hybrid equipment can add significantly to engine owners' capital improvement costs. For example, in rail operations, smaller locomotive operators may lack capital to invest in these technologies even though future fuel savings would make them cost-effective. Other added costs may not contribute to increased return on capital and thus may only be weighed as public priorities to the extent they are valued for their emission reduction potential. Likewise, investments in future technologies such as fully-electric equipment and facilities, require a distinct public commitment to funding emission reductions from hydrocarbon-based fuels.

Implementation Mechanisms

Establish a state Fleet Efficiency Consortium sponsored by the Department of Transportation, MPCA, and/or Commerce. This Consortium would comprise volunteer businesses with vehicle fleets as well as state and additional resources with fleet efficiency expertise. The Consortium would select a methodology for calculating and tracking mobile GHG emissions that would be standardized among participating fleets. Headcount and overhead cost for the Consortium from the public sector will need to be estimated.

Create a source of funds that supports existing successful voluntary GHG reduction efforts at fleets (e.g., Project Green Fleet, MPCA APU Project, MPCA Small Business Environmental Improvement Loan Project). See types of programs available for fleet managers in "Types of

[44] U.S. Environmental Protection Agency. (1998). *Emission Facts, Idling Vehicle Emissions* (EPA Document No. EPA420-F-98-014). Washington, DC: EPA Office of Mobile Sources.

GHG reductions." Amount of funds required will be based on average cost for multiple types of upgrades to various fleet types (e.g., APUs for heavy-duty truck fleets, hybrids for sedan fleets).

Add mobile emissions to the state Climate Registry project to ensure emissions are tracked appropriately and that volunteer businesses are recognized for their efforts.

Methodology: Create a standard methodology to establish baseline processes (CO_2e modeling), selection criteria, emissions reporting standards, and additional requirements for mobile source emission reduction plans.

Use of funds: These programs would continue existing programs and help fund the purchase of lower-emitting fleet vehicles, such as HEVs, as well as investments in aftermarket technology such as diesel retrofits, PHEV conversions, and APUs.

State Liaison: Create a set of standards to administer funding program. Management would include application and selection process for grants as well as recognition programs and best practices.

Related Policies/Programs in Place

Project Green Fleet (PGF) is the primary Minnesota collaborative for voluntary, diesel and mobile source emission-reduction projects. PGF currently works with dozens of school districts, the MPCA, the Minnesota Departments of Health and Education, Laidlaw, First Student, bus operator associations, tribes, private school bus and diesel fleet owners, and units of local government.

PGF will have done the following retrofits by the end of 2007:

- More than 500 school buses statewide,
- 41 heavy-duty trucks, and
- 10 transit buses.

PGF uses only EPA and/or CARB verified technology. Depending upon the combination, each retrofit will guarantee a minimum emission reduction of between 25% and 50%, depending upon the pollutant.

Idle Reduction Program: The MPCA, in cooperation with the US EPA, offers loans to help small trucking companies pay for idle reduction devices such as auxiliary power units. This equipment can reduce fuel consumption by 75%, which conserves resources, helps achieve energy independence, and reduces the emissions that contribute to soot and smog. During 2006, 30 loans were issued ranging from $7,500 to a maximum of $50,000. However, these funds are limited and the program's definition of "small business" for the purposes of the loan availability is prohibitive. http://www.pca.state.mn.us/programs/sbomb_loan.html

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

Many private truck stops have electrification or window mounted climate control units available. Advertising those locations may generate greater use.

Examples need to be quantified in terms of number of fleets impacted, number vehicles impacted (already done for PGF), capital cost, and annual GHG benefits (actual and expected).

Type(s) of GHG Reductions

Vehicles have broad GHG impacts. From the combustion of fuel, carbon dioxide, nitrous oxide, methane, ozone precursors, and black carbon are released. In addition, during the operation of air conditioning units, HFCs are released.

A recent U.S. House of Representatives committee reported that black carbon's contribution to climate change is second only to carbon dioxide.[45] Black carbon, or soot, results from the incomplete combustion of fossil fuels. While black carbon absorbs heat when airborne, it stays in the atmosphere for a relatively short period of time and mitigating such emissions would provide immediate climate change and health benefits.

Estimated GHG Reductions and Net Costs or Cost Savings

At a minimum, with the equipment currently used in PGF, for every 100 buses retrofitted the estimated emission reductions are CO_2, 860 lbs.; PM2.5, 120 lbs.; and volatile organic compounds (VOCs), 620 lbs. The emission and exposure reductions will be tracked over at least a 5-year period. (Source: Minnesota Environmental Initiative and MPCA.)

As an estimate, for 500 school buses, fuel savings of 11,250 gallons per year, or 937 gallons per month, are based on average reported idle reductions achieved in other areas of the country and vehicle fuel use and emissions data provided by the US EPA. Idle reduction activities, which include anti-idling policies and driver training, have shown that drivers can safely cut idling time by approximately 15 minutes per day through the use of idle reduction techniques.[46] US EPA data shows that diesel-powered buses use approximately 0.5 gallons of fuel per hour when idling.[47] Assuming that school buses operate 180 days of the year, 15 minutes of idle reduction on 500 school buses results in fuel savings of 11,250 gallons per year, or 938 gallons per month. Fuel savings can be higher when training and awareness are coupled with data logging and reporting activities (Table H-8).

[45] U.S. House of Representatives, Committee on Oversight and Government Reform, October 18, 2007.

[46] Estimate from Massachusetts Department of Environmental Protection, May 6, 2006.

[47] U.S. Environmental Protection Agency. (1998). *Emission Facts, Idling Vehicle Emissions* (EPA Document No. EPA420-F-98-014). Washington, D.C: EPA Office of Mobile Sources.

Table H-8. Estimated fuel and GHG reductions from TLU-12

Assumptions						
Private	**MPG**	**Annual Mileage**	**Annual Gallons of Fuel**	**Annual Average $MtCO_2$ Per Vehicle**	**Annual $MtCO_2$ Per Class (subtotals)**	**Average Annual Improvement**
3,353,858 sedans	24.6	25,000	1,016	9	30,732,202	5%
883,623 pickup trucks	18.4	25,000	1,359	12	10,825,135	5%
147,800 commercial trucks	8.8	50,000	5,682	51	7,571,917	7%
50,000 heavy-duty	5.7	100,000	17,544	182	9,116,474	7%
						6%
10% in private fleets						
Calculations						
58,245,728 = total $MtCO_2$						
5,824,573 = fleet-specific $MtCO_2$						
349,474 = $MtCO_2$ yield at 5% reduction per year						

MPG = miles per gallon; $MtCO_2$ = metric tons of carbon dioxide.

Key Uncertainties

None cited.

Additional Benefits and Costs

Estimates indicate that PGF's early efforts will directly reduce emissions exposure for approximately 30,000 school children statewide. Given the goal in this Option of doubling current programs, would reduce direct emissions exposure for another 30,000 school children.

If Minnesota continues to experience poor air quality, it could be designated as a non-attainment area for ground-level ozone or fine particulate matter. A 1998 Minnesota Chamber of Commerce study estimates that it would cost Minnesota businesses $189 to $266 million annually to comply with regulatory requirements associated with non-attainment for ground level ozone. Other significant restrictions, such as loss of federal transportation funding and limits on expansion, affect businesses in non-attainment regions. This program will help Minnesota avoid that designation.

Mobile source emission-reduction options gained greater relevance to climate change with the release of a study recently in the journal *Nature*. The study points out the significance of ground-level ozone levels to climate change improvement activities. Mobile sources are one of the primary sources of ground-level ozone precursors. According to the study, "Ozone could be twice as important as we previously thought as a driver of climate change." The study reports that "ozone near the ground damages plants, reducing their ability to mop up carbon dioxide from the atmosphere."[48]

[48] S. Sitch, P. M. Cox, W. J. Collins & C. Huntingford. Indirect radiative forcing of climate change through ozone effects on the land-carbon sink. *Nature* 448, 791-794 (16 August 2007). http://www.nature.com/nature/journal/v448/n7155/full/nature06059.html

Feasibility Issues

None cited.

Status of Group Approval

Approved

Level of Group Support

Unanimous

Barriers to Consensus

None

TLU-13. Reduce Maximum Speed Limits

Policy Description

Reduce maximum speed limits on highways in Minnesota to improve fuel economy and reduce GHG emissions per mile traveled.

Policy Design

Goals: Reduce maximum speed limit on urban interstates to 55 mph (from the current 65 mph) and to 60 mph on rural interstates (from the current 70 mph). Speed limits will be 55 mph on highways not specified by statute (same as today). This strategy reduces GHG emissions per mile traveled but does not reduce VMT.

Timing: Change law during 2008 legislative session with an effective date of January 1, 2009, so that there is enough time to educate the public about the change.

Parties Involved: Highway users, MnDOT, Minnesota State Patrol, local law enforcement.

Other: None.

Notes: The speed a vehicle is driven has a major impact on fuel economy. While each vehicle reaches its optimal fuel economy at a different speed (or range of speeds), gas mileage usually decreases rapidly at speeds above 55 to 60 mph according to the US EPA and the US Department of Commerce.

Implementation Mechanisms

Would require increased enforcement so cost for state and local law enforcement would be required.

Should ask MnDOT for a cost estimate for the change over signs and educational materials for the current higher speed limits.

Related Policies/Programs in Place

Speed limits are currently 55 mph on urban interstates and 65 mph on rural interstates in nine states (Alaska, Connecticut, Delaware, Illinois, New Jersey, Oregon, Pennsylvania, Rhode Island, and Vermont.) The only state that specifies 60 mph for a rural interstate is Hawaii.

Type(s) of GHG Reductions

Primarily CO_2.

Estimated GHG Reductions and Net Costs or Cost Savings

Quantification Methods:

Calculate difference in fuel and time from:

Diesels:	70 mph at ~6 mpg to	60 mph at ~7 mpg
Gasoline vehicles:	70 mph at ~26 mpg to	60 mph at ~30 mpg

Value for the cost of time:

Diesels:	$25.53
Gasoline vehicles:	$14.76/hour

Basis: National after-tax wage rate.

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.

Jeffrey Ang-Olson 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:

Fuel Savings: The diesel fuel consumption from Class 8 diesel trucks was multiplied by 60% (low) or 80% (high) 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% 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 CO_2 emissions to estimate the reduction in CO_2 from this measure. Fuel cost savings were calculated by multiplying the per unit fuel cost by the number of gallons reduced.

Increased Driving Time: This was estimated as 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.

Same process for automobiles.

Key Assumptions: 60% to 80% of Class 8 diesel truck travel (fuel consumption) is spent at speeds above 60 mph, assumed to be at 70 mph on average. Fifty 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) for heavy-duty diesel trucks.

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.

Reductions
Upon adoption:

- Strict adherence to 65 mph: 210,000 metric tons annually (gas savings of $79 million)
- Strict adherence to 60 mph: 400,000 metric tons annually (gas savings of $158 million)
- Strict adherence to 55 mph: 570,000 metric tons annually (gas savings of $238 million)

Year 2020:

- Strict adherence to 65 mph: 250,000 metric tons annually (gas savings of $94 million)
- Strict adherence to 60 mph: 470,000 metric tons annually (gas savings of $187 million)
- Strict adherence to 55 mph: 680,000 metric tons annually (gas savings of $281 million)

Values for 60 mph used in summary table.

Estimated Costs: Administrative costs for strict enforcement are likely to be offset by revenues from fines. Savings in gasoline costs will accrue to motorists.

Key Uncertainties

The ability to enforce a speed limit significantly lower than current policy is uncertain.

Additional Benefits and Costs

A significant additional benefit of lowering speed limits is reduced injuries and fatalities. The Canada Safety Council[49] states that "As speed increases over 100 km/h (60 mph), the fatality rate of vehicle occupants goes up exponentially. For example, the chances of being killed in a vehicle traveling at 120 km/h (72 mph) are four times higher than at 100 km/h (60 mph)."

The Canada Safety Council also notes that "a recent study examined the impact of higher travel speeds on US rural interstates after the repeal in November 1995 of the national speed limit. Researchers found states that had increased their speed limits to 75 mph (120 km/h) experienced a shocking 38 per cent increase in deaths per million vehicle miles than expected, compared to

[49] http://www.safety-council.org/

deaths in those states that did not change their speed limits. States that increased speed limits to 70 mph (112 km/h) showed a 35% increase in fatalities."

In 2006, 494 people died in vehicle crashes in Minnesota, 35,025 were injured, and the economic cost was $1.5 billion (rounded).[50]

Lower speeds will also reduce local air emissions and air pollution. See Mullen, M A; Wilson Jr, J H; Gottsman, L ; Noland, R B; Schroeer, W L, "Emissions Impact of Eliminating National Speed Limits: One Year Later", *Transportation Research Record No. 1587, Effects of Transportation on Energy and Air Quality*, 1997,[51] which states:

> The National Highway System (NHS) bill passed by Congress in November 1995 eliminated the national maximum speed limit. It has allowed states to set their own speed limits, which many have changed during the past year. This analysis examines the impact of speed limit changes 1 year after passage of the NHS. Oxides of nitrogen (NO_x), carbon monoxide, and volatile organic compounds are analyzed and are found to have increased nationwide by up to 6%, 7%, and 2%, respectively. Much of the increase has occurred in western states, which generally have increased vehicle speeds more than in eastern and midwestern states. For example, in Texas NOx emissions are estimated to have increased by 35% due to large increases in highway and arterial speed limits.

Feasibility Issues

Will require enforcement.

Status of Group Approval

Approved

Level of Group Support

Majority

Barriers to Consensus

Concerns included ability to enforce, potential for non-compliance even with increased enforcement, and impact on travel times.

[50] Minnesota Motor Vehicle Crash Facts 2006, published by the Minnesota Department of Public Safety, Office of Traffic Safety, page ii.

[51] http://pubsindex.trb.org/document/view/default.asp?lbid=474594

TLU-14 Freight Mode Shifts: Intermodal and Rail

Policy Description

Transportation of freight by railroad generally results in less fuel use and GHG emissions than transportation by truck. This option would support the expansion of intermodal rail service for Minnesota shippers through public/private partnerships. In addition, the state would strive to increase the competitiveness of rail rates for all Minnesota shippers.

Develop public/private partnerships to support mode shifts to rail, and decrease truck VMT relative to the baseline. This strategy accounts for part of the VMT reduction goal of TLU Area 1.

Policy Design

Improved rail service and the ability of the rail system to meet future demand *implicitly* leads to system-wide greenhouse gas reductions by shifting projected freight and passengers to rail or by preventing a shift to a less efficient mode. Improvements to the rail system or associated equipment can also have *direct* impacts on greenhouse gas emissions. Locomotive idling produces significant emissions and can be mitigated by reducing system congestion and choke points and by using improved technology.

Goals

Goals: As the population of Minnesota and the world increases, so does the volume of freight. The ten year freight forecast indicates a 25% increase in total freight by 2017. Moving goods in the most economical way is an essential component of our economy and lives. Additionally, seeking policies that balance the need for GHG reduction and consumer affordability will best serve our future.

The TWG highlights for the MCCAG the importance of the freight sector, especially given its rapid growth. MnDOT has in progress a statewide freight plan. The MCCAG is not yet ready to develop its own emissions reduction targets, but recommends that the in-progress study ensure that its goals include a substantial freight mode shift towards growth in rail freight, and explicitly address the GHG emissions implications of its Freight Plan, with respect to the Governor's GHG commitments.

- Decrease inefficiencies and limitations in the existing Minnesota rail network and increase overall capacity by reducing system congestion, bottlenecks, and chokepoints.
- Prevent modal shift of freight from rail to truck due to lack of capacity. Maximize the amount of freight that can be moved by rail in order to sustain projected growth in domestic and international goods movement in the state.

Timing: Policy implementation should commence during the 2008 legislative season.

Parties Involved: MnDOT, Minnesota Chamber of Commerce, Minnesota Regional Railroad Association, Minnesota Trucking Associations

Other: None.

Implementation Mechanisms

- Create more effective freight transition between modes at intermodal yards, ports and airports.
- Establish tax credits for rail expansion/preservation.
- Direct MnDOT to preserve existing corridors and consider new regional rail options in the State Transportation Infrastructure Plan (STIP).

Related Policies/Programs in Place

The Minnesota PCA small business environmental low-interest loan program has been made available to trucking companies, however funds are very limited and the PCA definition of small business for the purposes of the loan is very prohibitive.

Many private truck stops have electrification or window mounted climate control units available. Advertising those locations by mapping them at public rest stops may generate greater use.

Various EPA funding programs.

Grant aids allocated in the Federal energy bill. Section 1112 of the bill sets aside $200M for short-line (class II and III) rail improvements.

Type(s) of GHG Reductions

Primarily CO_2 emissions.

Estimated GHG Savings and Costs per $MtCO_2e$

Data Sources: None.

Quantification Methods: None.

Key Assumptions: None.

Key Uncertainties

None cited.

Additional Benefits and Costs

By shifting freight from truck to rail, this option could result in small additional benefits related to highway congestion and highway safety.

Feasibility Issues

The success of this strategy depends on sufficient shipper demand and willingness of the railroads to provide intermodal service. These factors are largely outside government control.

Status of Group Approval

Approved

Level of Group Support

Super Majority

Barriers to Consensus

Concern about lack of specificity.