environmental defense fund
finding the ways that work

1875 Connecticut Ave NW
Washington DC 20009

August 29, 2008

Mr. Rob Atkinson
Chairman
National Surface Transportation Infrastructure Financing Commission
1200 NJ Avenue SE
Washington, DC 20590

Dear Mr. Atkinson:

Thank you for the opportunity to offer the views of Environmental Defense Fund on the Interim Report of your Commission and to make suggestions for the final report. The Environmental Defense Fund is a New York-based non-profit advocacy organization with over 500,000 members links law, science, and economics to protect the environment.

EDF agrees with the general thrust of the Commission's interim report, which notes that:

- Increased investment is needed in America's transportation systems;
- Investment should focus first on improving the efficiency and operation of the system, maximizing use of the system's current capacity before funding system expansion;
- It is time for a thorough reassessment of how US surface transportation is funded;
- The current financing approach does not link use closely with prices paid by most users;
- The fuel tax is no longer sufficient as a financing source;
- Direct user charges that related more closely to use of the system should be explored and rapidly developed;
- These approaches should be used to significantly reduce negative environmental effects, including greenhouse gas emissions and other pollutants.

EDF supports increased transportation funding, but only if state, regional, and local government agencies are held accountable for ensuring timely progress in reducing greenhouse gas emissions from transportation related to motor vehicle travel. If increased funding enables the existing stream of transportation revenues to be used for business-as-usual financing of highway capacity expansion without accountability for climate impacts, this will impose extra costs on every other sector of the transportation industry and the larger economy or it will sharply reduce the effectiveness of greenhouse emissions management.

America must develop a national transportation strategy that ensures progress in boosting the efficiency of motor vehicles, reducing the carbon content of transportation energy, and reducing per capita vehicle miles traveled. An attached paper, "Climate Sensitive Transportation Management: Setting Goals for Traffic Growth," (Attachment 2) reviews how different transportation strategies might interact to help meet greenhouse gas reduction goals as required

to reduce the likelihood of catastrophic climate change, drawing on recent findings of the International Panel on Climate Change. We hope you will consider this review and we urge the Commission to give greater consideration to how transportation financing, climate change, and energy policy might intersect and be aligned for mutual benefit.

Much of America's infrastructure was developed based on the presumption of low oil prices, sprawl development, and car dependence. With oil prices likely to remain above $110 a barrel and the U.S. economy in distress, there is an urgent need to improve the productivity and effectiveness of America's existing infrastructure with intelligent transportation systems and other high performance transportation management strategies. Done well, this will boost U.S. economic competitiveness, create good jobs for working Americans, reduce dependence on foreign oil and greenhouse gas emissions, and expand travel alternatives to driving. Transportation financing systems should be designed to help shape transportation demand and supply to meet these national objectives. If energy prices remain high as now expected, there will be less need to accommodate growth in motor vehicle traffic with new roads and more opportunity to channel investment into high productivity initiatives that boost freight efficiency, cut congestion, boost travel choices, and cut pollution. A flat VMT curve as suggested as a possible strategy in Attachment 2 may not be so hard to achieve under these circumstances, aided by sound transportation pricing, intelligent transportation systems, and smart growth management policies.

The approach used in Germany, which since 2005 has had in place a system for satellite-based, distance and emission based truck tolls on most major highways, is one that America should emulate as a transitional approach towards more widespread road pricing for all vehicles. The $5 billion annual revenues from this are used to fund road, rail, and waterway transportation system improvements and operations, benefiting freight carriers and shippers, while cutting pollution. The recent FHWA-funded pilot projects in Oregon and Washington states show the practicality of such an approach in the U.S. context. To showcase this approach and to help finance needed freight system improvements, it would make sense for national weight- and emission-based truck user charges to replace the federal diesel fuel tax, with testing and implementation over the course of the next six-year federal transportation bill.

The next transportation bill should lay the foundation for a transition to a national VMT fee with local option congestion pricing to augment or replace traditional fuel taxes. If revenues are appropriately targeted, smart road user fees, to be phased in gradually over the next decade or more, could lead to more effective overall transportation system management and significant reductions in environmental pollution and fuel use. A July 2008 analysis by David Lewis for the Brookings Institution Hamilton Project which recommended a national system of congestion pricing for crowded highways (*America's Traffic Congestion Problem: A Proposal for Nationwide Reform*) recommends the dedication of some of the revenues from road user fees as progressive refundable mobility tax credit to compensate low income households for the increased costs of congestion pricing, with the balance focused on transportation investment. The Commission should endorse such an approach. Numerous studies show that such pricing systems can improve equity in access if revenues are targeted appropriately to expand travel choices, with added user side subsidies for low income households.

Other sources of transportation funding should be fully explored by the Commission, including public-private partnerships, asset leases, and bonding, including near-term borrowing on anticipated future carbon emission allowance auction revenues or other transportation greenhouse gas related revenues. The Environmental Defense Fund has cooperated with a dozen civic and environmental groups in California to develop a set of principles on Public Private Partnerships, which we recommend to the Commission. These are shown as Attachment 1.

A portion of the revenue generated by the auction of carbon allowances under future cap-and-trade climate legislation, which could amount to many billions of dollars, could be used to enable early action by state, regional, and local agencies to reduce greenhouse gases related to transportation and land development. With the expiration of the federal transportation law SAFETEA-LU in September 2009 come other opportunities to structure new incentives, funding frameworks, and performance requirements to ensure timely progress to meet environmental, health, and mobility goals. New funds could be targeted in both climate and transportation legislation to: (1) spur institutional capacity development, (2) incentivize innovative best practices, (3) reward demonstrated performance, (4) reward plans for timely performance, and (5) support frontloaded investments that spur early action for long-term reductions in greenhouse gases, leveraging currently available resources with innovative finance techniques, such as a new climate infrastructure bank.

One portion of available funding could be focused on **institutional capacity development**, distributed to all states with a sub-allocation to metropolitan regions and qualified municipal authorities based on population and economic activity for the purpose of enhancing institutional capacity and cooperation in transportation greenhouse gas (GHG)/VMT related data collection and transportation and land use planning activities.

Another portion of available funding could **incentivize innovative best practices,** and made available as discretionary funds to be granted or loaned through performance-tied funding or loan agreements to states, metropolitan regions, qualified municipal authorities, and non-profit entities which have the authority to operate or manage transportation infrastructure or services. Such grants or loans should include requirements for the grant or loan recipient to submit plans and/or project specifications that demonstrate a capacity and workplan to ensure that the initiative will contribute to reduction of GHG emissions through more effective operation, management, or development of transportation and land use activities, with appropriate independent measurement and monitoring of performance, periodic reporting on performance, and adoption of contractually binding contingency measures or performance bonds to ensure delivery of promised GHG/VMT reductions.

A portion of available funding could **reward demonstrated performance,** and be made available as formula transportation GHG performance incentive funds, to be granted or loaned to states, metropolitan regions, or qualified municipal authorities that can demonstrate their transportation GHGs or VMT per capita have either decreased by some percentage a year over the last 3 years, or are at least some percentage below the median U.S. state, metropolitan, or municipal level of transportation GHGs or VMT per capita, as defined by rules to be issued by US EPA in cooperation with US DOE and US DOT.

Another portion of available funding could reward states, regions, and jurisdictions that **develop plans for timely performance** in reducing transportation and land use related GHG emissions.

These funds would be available to entities that develop and adopt new regional blueprints and transportation management and operation plans for managing traffic growth and encouraging more compact mixed-use development, with funds aimed at helping in timely plan implementation of GHG/VMT reduction goals.

Another portion of available funding could be directed to finance a **federal transportation GHG revolving fund** that serves as a low cost source of capital, start-up, and bridge loan financing for public, private, or public-private partnership and non-profit initiatives designed to produce timely reductions in GHGs from the transportation motor vehicle use and the built environment. This might be modeled after infrastructure banks and TIFIA-like initiatives that are being used in the area of water and transportation. This transportation GHG revolving fund would be made available to support loans for public transportation service infrastructure development, pedestrian and bicycle facilities, improvements and services, transit oriented development, brownfield remediation, parking management and pricing, carsharing and bikesharing initiatives, time of day pricing of existing roads and highways, cordon pricing, and incentives for pay-as-you-drive insurance. It might provide a supplement to the New Starts and Small Starts transit capital finance programs, supporting integrated transportation and land development initiatives with loans that will be repaid in the long run by tax-increment financing, real estate value capture, parking or road user fees, or other revenues.

EDF agrees with the Commission that performance-based approaches to transportation investment have not received the emphasis that will be necessary for the future. These should account for the broader system impacts of investments, including indirect land use and induced traffic impacts, along with related externality costs, including greenhouse gas emissions and health impacts.

In addition to shaping a new performance-focused funding framework, federal law should eliminate barriers to needed market-based transportation reforms by (1) ending all federal prohibitions on tolling existing highways; (2) requiring a study of how state insurance regulations inhibit or facilitate pay-as-you-drive insurance with reporting by the states on steps they are taking to eliminate barriers to such policies, and a study of how PAYD insurance could facilitate a transition to VMT fees.

EDF disagrees with the Commission's interim report inference that the federal project approval process is a primary cause of undue delay in getting roads from planning to completion. Various studies have shown that it is lack of consensus at a local and state level about the need for major projects and lack of financing that are the principal causes of delay in project development. The federally required planning and environmental review process can be improved, but if employed soundly, it provides a valuable framework for identifying alternatives, developing consensus about transportation investments, identifying ways to avoid or minimize adverse impacts on communities and the environment, and engaging the public and their elected representatives in decision-making. EDF supports improving the efficiency of this process by employing strategic environmental assessment approaches at the plan and program level to complement project-level environmental impact assessment. Further efficiency can be created by developing performance-based funding agreements and performance-based contracts to guarantee environmental performance once projects are open and operating.

Thank you for considering our comments.

Sincerely,

Michael Replogle
Transportation Director
Environmental Defense Fund

Attachment 1

California Council of Land Trusts * California League for Environmental Enforcement Now * California State Parks Foundation * Coalition for Clean Air * Communities for Clean Ports * Community Action to Fight Asthma * EndOil * Environmental Defense Fund * Food and Water Watch * Planning and Conservation League * Sierra Club California * Trust for Public Land

Principles for Public Private Partnerships

Public-private partnerships (P3s) are agreements between public entities and private entities in which there is some shared responsibility for risk and financing to fund infrastructure or manage and operate that infrastructure or public services. P3s can take many forms and have been used increasingly since the 1980s to fund infrastructure projects around the globe, including in California. California legislators, the Governor, business community members, organized labor, and environmentalists have lately debated proposed legislation that would expand the use of P3s in the state. Given this, environmental and health groups listed on this letterhead have considered and agreed that the following principles should govern P3s and be included in any legislation, statute or regulation addressing or expanding P3s.

1. P3s should only be used to *simultaneously* deliver high performance to achieve multiple public values, including environmental quality and public health. They should not be used simply to deal with public entity cash-flow problems. They should not be considered exclusively to build new capacity, but should be considered for improving operation of existing infrastructure.

2. Outcome-based standards to measure performance, including environmental performance, should be included in P3 agreements. Outcome-based performance standards focus on measurable objectives and allow flexibility in determining how best to achieve those objectives.

3. Environmental performance and protection goals should be incorporated early in the design of the P3 bidding process. These goals must include contributing to reducing air pollution and greenhouse gas emissions to achieve state goals; protecting parks and historic sites; conserving natural and recreational resources and working landscapes, including farmland and open space; and preserving wildlife habitat to help achieve the state's species protection goals.

4. P3 agreements must be developed with transparency, including ample opportunities for public oversight and comment. Experience shows that P3 agreements completed without public oversight fall short of meeting the full potential for P3s to garner public benefit. They also sour public opinion about P3s. Independent auditing of transportation and revenue forecasts before final project approvals will help reduce problems associated with overly optimistic proposals from P3 partners. The audit should include, but not be limited to, a clear explanation of the anticipated total cost borne by the user and the public, profits anticipated by the private entity and source of those profits, and anticipated externalities, expressed quantitatively and qualitatively, and who will bear those external costs.

5. P3 agreements should include enforceable compliance mechanisms and penalties that can come into play if it is shown in the periodic review or through other monitoring that the project is not meeting performance goals. Compensation and penalty structures included in the agreement should be aligned to clearly reward superior performance, including environmental performance, and penalize for failure to meet performance standards. There should be incentives for timely compliance and for timely remediation of contracting failures.

6. P3 agreements must be designed to ensure that private entity default won't result in an interruption of services, sustained performance degradation, or loss of public investment. This should include contingency provisions or performance bonds in the concession contract.

7. Project selection must be driven by public interest rather than private profit motive or the promise of investor income.

8. P3 agreements must include periodic evaluation and public reporting by a qualified agency or third party on the project performance to ensure that the project is meeting agreed-upon performance. This review must occur not less than every three years.

9. These agreements should require an up-front estimate of the life expectancy of the facility and an assurance that the facility is functioning and in good condition upon the end of the contract. The public agency should disclose preliminary plans for continuing services or replacing the facility when the proposed service or facility has passed its useful life.

10. P3 agreements must ensure that guaranteed return to private investors should be reasonable and proportionate to the risk assumed by the investor.

11. P3 contracts must contain clear terms regarding how user fees will be set and adjusted to ensure that performance goals, including environmental and system performance goals, are met.

12. P3 toll road projects should be designed to improve the provision of public transit early in the project's contract life in corridors where transit investment is appropriate. Transportation P3s have an important role to play in improving public transportation performance. Dedicating P3 toll road revenues to public transit up front in corridors where transit services could play a role in mobility may help optimize benefits and increase the likelihood that the benefits of the toll road will accrue to a greater share of the potential travelers in the corridor, not just those who can afford to pay the tolls.

13. User fee diversions out of the project or corridor in which they are collected would be allowed for other purposes only if a project operator is meeting its financial obligations and satisfying the performance goals established for the project.

14. P3 agreements must not contain no-compete clauses.

15. P3 contracts should not exceed 35 years.

Attachment 2

Climate Sensitive Transportation Management: Setting Goals for Traffic Growth

by

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Abstract

This paper illustrates a methodology to evaluate alternative national traffic growth goals against greenhouse gas reduction goals, considering motor vehicle fleet characteristics and fuel policies. Several alternative scenarios are evaluated, ranging from historic trends to a "Climate Sensitive Transportation Management" (CSTM) policy that would seek to stabilize U.S. vehicle miles traveled (VMT) at projected 2010 levels through 2050. Achieving such goals while supporting healthy economic growth would require a combination of policies to boost the spatial efficiency of population and employment growth, expand travel choices, and increase vehicle occupancy and network efficiency, borrowing from approaches used in other advanced economies.

U.S. VMT has been flat to declining since 2004, suggesting that historical VMT trends may no longer be useful guides to future VMT growth. If the CSTM policy is achieved, it would decrease per capita VMT back to 2000 levels by 2020, cut per capita VMT by 18% below 2010 levels by 2030, and produce a 36% reduction in per capita VMT by 2050, assuming 420 million population. By holding 2050 U.S. VMT to 2.8 trillion vs. the US DOE forecast of 5.5 trillion, a CSTM policy would cut cumulative vehicle emissions by 25 billion metric tons of CO_2 (gigatons of CO_2e, $GtCO_2e$) in 2050, seven-tenths of what would be needed to achieve an 80% reduction in GHGs from this source category by 2050 given projected fuel economy and fuels policies. In 2030 and 2040, the CSTM would cut cumulative light vehicle emissions by 7.7 and 19 $GtCO_2e$ respectively.

INTRODUCTION

There is an emerging consensus that immediate action is needed to address climate change by reducing greenhouse gas (GHG) emissions from all sectors of the global economy if serious harms to global ecosystems and economies are to be minimized.[(i)] Many believe that reductions 20 percent below 1990 levels are needed by 2020 and reductions 80 percent below 1990 are needed by 2050 in the world's most advanced economies as part of a GHG stabilization program.[(ii)] In transportation, this will require not just improving vehicle fuel economy and reducing carbon content in transportation energy sources, but also reducing the amount of travel that produces GHGs. Achieving these goals will also require development of new planning and analysis frameworks for transportation GHG policy, a key focus of this paper.

Just as Corporate Average Fuel Efficiency (CAFE) standards have long been set for vehicle fuel economy, seeking to shape system performance, so too it is appropriate for governmental bodies to establish targets for motor vehicle traffic to help ensure that travel demand does not lead to the failure of environmental or system management policies. New intelligent transportation systems and variable road user charging systems are coming into the mainstream to boost safety, improve traveler convenience, and support transportation system financing. These also increase the potential for system managers to shape travel demand.

Yet differences must be acknowledged in policy design and implementation between regulating technology performance and setting performance goals for transportation broad systems. Travel demand and transportation systems vary widely across regions depending on past land use and infrastructure decisions, incentives, and policies. Policy options and strategies may be synergistic or antagonistic with others, so the combination of investments and policies adopted and the success of their implementation makes it difficult to predict the specific impact of a given policy or investment. However, many regional studies and a few recent national scale studies have estimated the general potential for a suite of policies to slow or reverse the growth of VMT. Several states have begun to discuss or adopt VMT reduction goals in GHG planning.

This paper focuses on the planning and analysis framework linking specific VMT growth rate assumptions to cumulative GHG emissions over time, a key factor in climate change policy. It begins with a discussion of the methodology and assumptions of a motor vehicle stock model used to evaluate greenhouse gas implications of reducing light duty vehicle use. The paper then discusses VMT trends, recent analyses of strategies to reduce VMT growth, and the implications of setting different goals as part of a GHG planning framework.

STOCK MODELING ANALYSIS MODEL AND ASSUMPTIONS

This study uses a stock turnover model to analyze the effect of climate sensitive transportation management (CSTM) policy on reducing light duty vehicle greenhouse gas emissions. The

model is a spreadsheet-based accounting model that calculates fuel consumption of all light duty vehicles on the road (the "rolling stock"). Fuel use and the resulting greenhouse emissions of the rolling stock depend on the projected total stock vehicle miles traveled (VMT) and the average vehicle fuel consumption rate. Average fuel consumption rate of the rolling stock is computed from fuel economy data, new vehicle sales, and national-level statistics on how much vehicles are driven as they age and how long vehicles last.

Similar vehicle stock turnover models have been developed by several government agencies and research institutes, including the Stockholm Environmental Institute US Center LEAP software system, the DOE VISION model, the DOE-EIA NEMS model and the EPA MOVES model. Even though we did not run these models, we validated our modeling results with published results from LEAP, NEMS and MOVES. Our modeling results of on-road fuel economy compares well with published results from NEMS and MOVES, and our estimate of stock fuel consumption in 2030 under the BAU is within one percent of the estimate from LEAP prepared by National Resource Defense Council (NRDC, 2007).[iii] For a more detailed description of the stock turnover model, including the model specification, see Appendix A of the Environmental Defense report *Global Warming on the Road.*[iv]

Data sources and assumptions

The projected stock VMT in the BAU scenario follows the projection of light vehicle VMT in the Energy Information Administration's Annual Energy Outlook (AEO) 2008,[v] calibrated to the federal statistics for actual total light vehicle VMT in 2005. The stock VMT covers cars and light trucks with a gross vehicle weight (GVW) of less than 10,000 lbs. AEO 2008's VMT projection only extends to 2030 and we extrapolate the VMT trend from 2031 through 2050 based on the VMT projection from Department of Energy's VISION model.

Historical data of fuel economy and new vehicle sales come from federal fuel economy databases, specifically the National Highway Traffic Safety Administration (NHTSA) annual CAFE data reports[vi] and EPA (2008).[vii] The statistics on how much vehicles of a given are driven (usage rate) and the probability that a vehicle survives to the given age (survival rate) were adopted from a NHTSA report on vehicle survivability and travel mileage schedule (NHTSA, 2006).

Other key assumptions for rolling stock analysis include:

- ***CO_2 factor.*** A gallon of gasoline emits 25 lbs of CO_2 and a gallon of diesel emits 28 lbs of CO_2. The carbon emissions estimate given here covers full fuel cycle (FFC) emissions, including direct emissions from fuel combustion and upstream emissions from fuel extraction, refining and distribution.

- ***Fuel economy shortfall.*** On-road fuel economy is assumed to be 20% less than the CAFE (test) value.

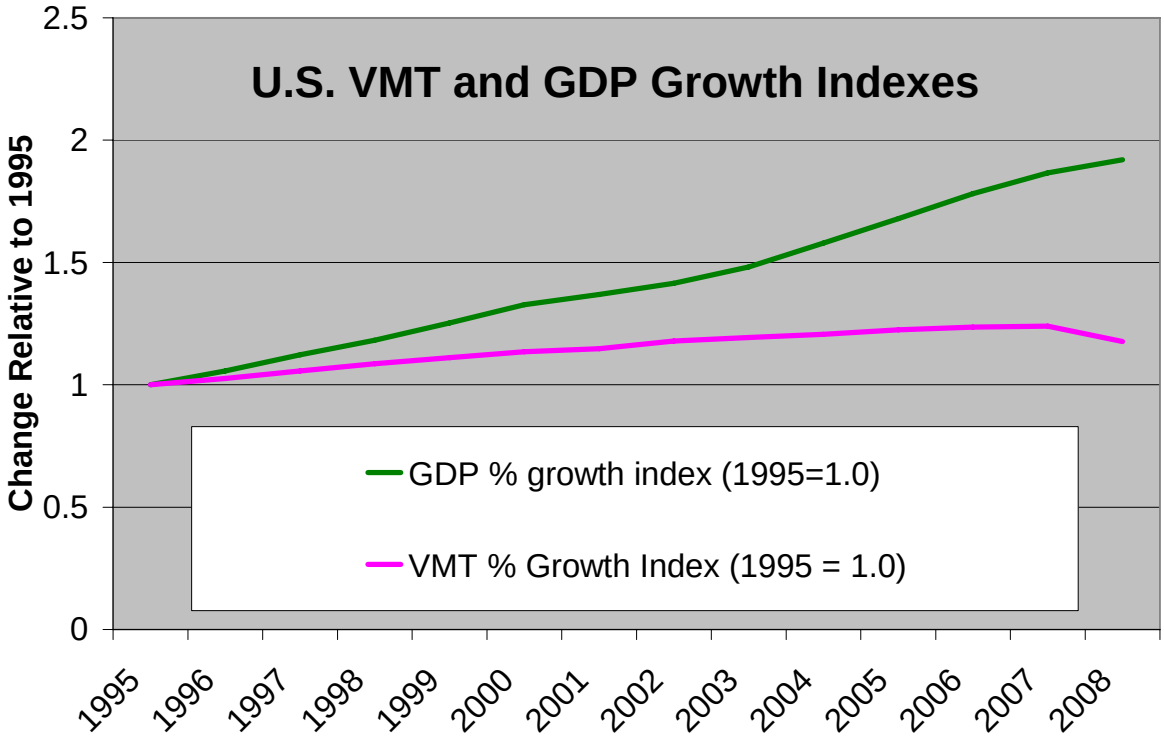
- ***Penetration of diesel vehicles.*** All light vehicles with GVW up to 8,500 lbs use gasoline only, and one-third of light vehicles with 8,501-10,000 lbs GVW (Class 2b trucks) use diesel fuel.

This GHG reduction analysis does not consider heavy duty VMT GHG reduction benefits which could result from reducing projected truck traffic growth through greater use of rail and water freight modes or freight system and logistics efficiency improvements. There are considerable GHG reduction opportunities in the freight sector and further analysis of those possibilities should be undertaken in the near future to support further policy development in that area.

VMT TRENDS AND PROSPECTS FOR REDUCING OR CAPPING U.S. VMT

Much has been done and still needs to be done to shift vehicles away from carbon-based fuels and to reduce tailpipe greenhouse gas emissions. The Energy Independence and Security Act of 2007 requires sets a minimal fuel economy standard for new passenger vehicles of at least 35 miles per gallon by 2020, which would lead to a 41 percent increase in fleet-wide fuel economy by 2030. The Energy Bill also sets a fuel requirement that might reduce lifecycle GHG emissions by up to 10 percent by 2022. If there were no growth in VMT, these measures might reduce GHG emissions from cars and light trucks to 20 percent below 1990 levels in 2030. But VMT is forecast by DOE to grow 48 percent between 2005 and 2030, leading to a growth in GHG emissions of more than 20 percent above 1990 levels.

U.S. VMT has been flat or declining in recent years, after growing steadily for decades. From May 2007 to May 2008, VMT fell 3.7 percent nationally due to higher fuel prices. FHWA data suggests VMT in 2008 will be at about the same level as in 2003 or 2004.[viii] Throughout this time, real gross domestic product has been growing fairly steadily at about 1 percent a year, suggesting a growing decoupling of traffic growth from economic growth, as Figure 1 shows.



A recent Harris poll shows 92 percent of Americans believe that gas prices will only trend upward. If fuel prices stay high, it is likely to render obsolete various forecasts as well as long-standing rules of thumb about how much people will change their behavior in response to changes in travel price, travel options and other conditions. Families are being squeezed by transportation costs that are now their second largest expense after housing (18 percent of household income on average), but many face limited travel choices.

A recent Urban Land Institute Study[ix] estimated that adopting efficient land use strategies for a portion of new development could slow VMT growth by 12-18% in metropolitan areas, or 10-14% nationally by 2050. They conclude that this level of reduction is achievable with land use changes alone, excluding complementary measures such as transportation pricing or major expansions of transit. The book documents the demographic and market trends that make this scenario a realistic goal in the next several decades. In 2030, such a scenario would yield GHG reductions of 80 $MMTCO_2$, equal to half the cumulative savings of a 35 MPG fuel economy standard. The authors calculate potential transportation CO_2 savings of up to 38% with a comprehensive policy set including smart growth, transit expansion, slower growth in highway expansion and pricing measures, not accounting for recent fuel price changes.

Bill Cowart, an analyst at Cambridge Systematics, has developed preliminary estimates of potential VMT reductions resulting from a broadly implemented set of policy options, including efficient land use and development, transit expansion, parking measures, pay-as-you-drive insurance, and improved bicycle and pedestrian infrastructure. These are being refined in a more comprehensive study slated for publication in early 2009. In a preliminary analysis published by the Natural Resources Defense Council,[x] William Cowart estimated a potential 21% reduction

in national VMT by 2030 from the projected business-as-usual national traffic growth forecast, not accounting for impacts from recent fuel price changes.

In its July 2007 report, *A New Vision for the 21st Century*, the American Association of State Highway and Transportation Officials (AASHTO)[xi] laid out a goal of cutting light duty VMT growth in half by 2055, yielding 5 trillion VMT in that year rather than 7 trillion, compared to 3 trillion today. Assuming a linear trend, the Center for Clean Air Policy (CCAP) calculated that in 2030 this would amount a 23% reduction in VMT growth from DOE projected baseline forecasts.[xii] AASHTO proposes to reduce VMT growth through operations management techniques that maximize performance of transportation infrastructure, shifting a significant number of trips to transit, shifting a significant amount of freight from truck to rail, encouraging efficient land-use patterns, developing pedestrian and bicycle infrastructure, and encouraging telecommuting. This AASHTO vision suggests continuing slow growth in per capita VMT through the next half century, with hope for technology fixes, like hydrogen vehicles, to solve long-term transportation environmental problems.

A NEW VISION FOR TRANSPORTATION AND GHG PLANNING

In contrast, Washington State's climate action plan includes an aggressive VMT reduction target. That state's HB 2815, signed into law in March 2008, sets a goal of capping and managing light-duty VMT between 2010 and 2020, with effective reductions in total VMT between 2035 and 2050. This would bring per capita VMT back to 2000 levels by 2020 and to 1990 levels shortly before 2035, seeking a modest reduction in VMT thereafter, as Figures 1 and 2 illustrate. This might be achieved by full marginal cost transportation pricing, VMT fees, and a shift to policies supporting walkable, bikeable, and transit oriented development and advanced telecommunications to facilitate efficient regional mobility patterns and systems. Many of these policies are being examined in state and federal studies and increasingly are being advanced through the transportation planning process.

Figure 1
Washington State VMT:
Prior Business-As-Usual Forecast vs. Goal in State Law

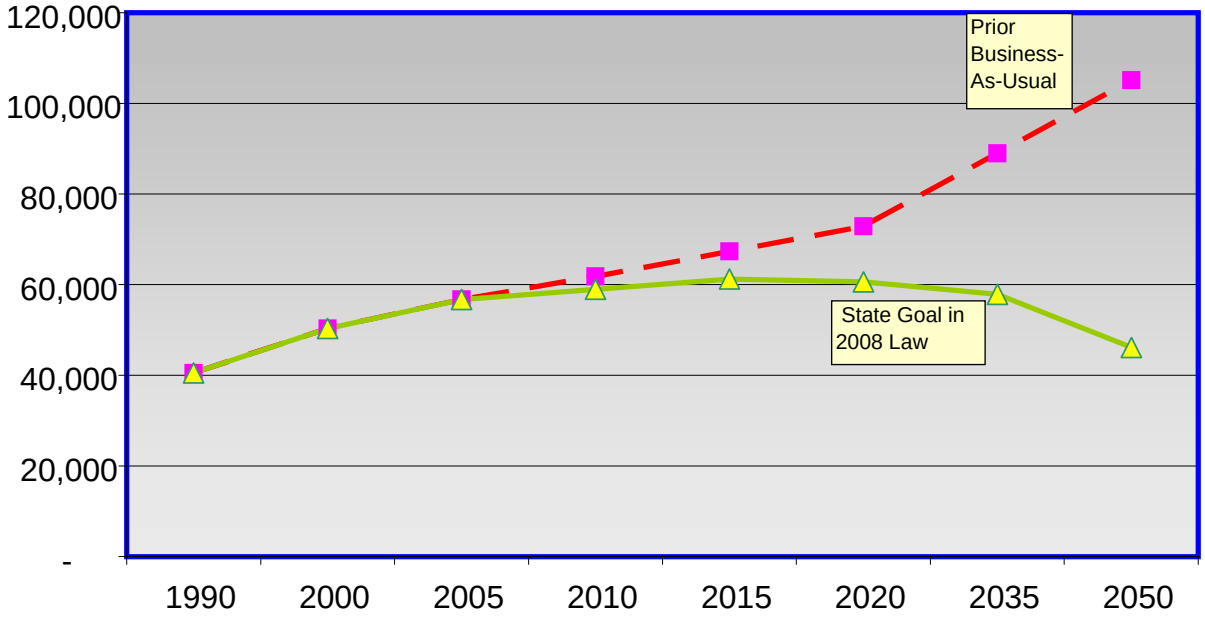
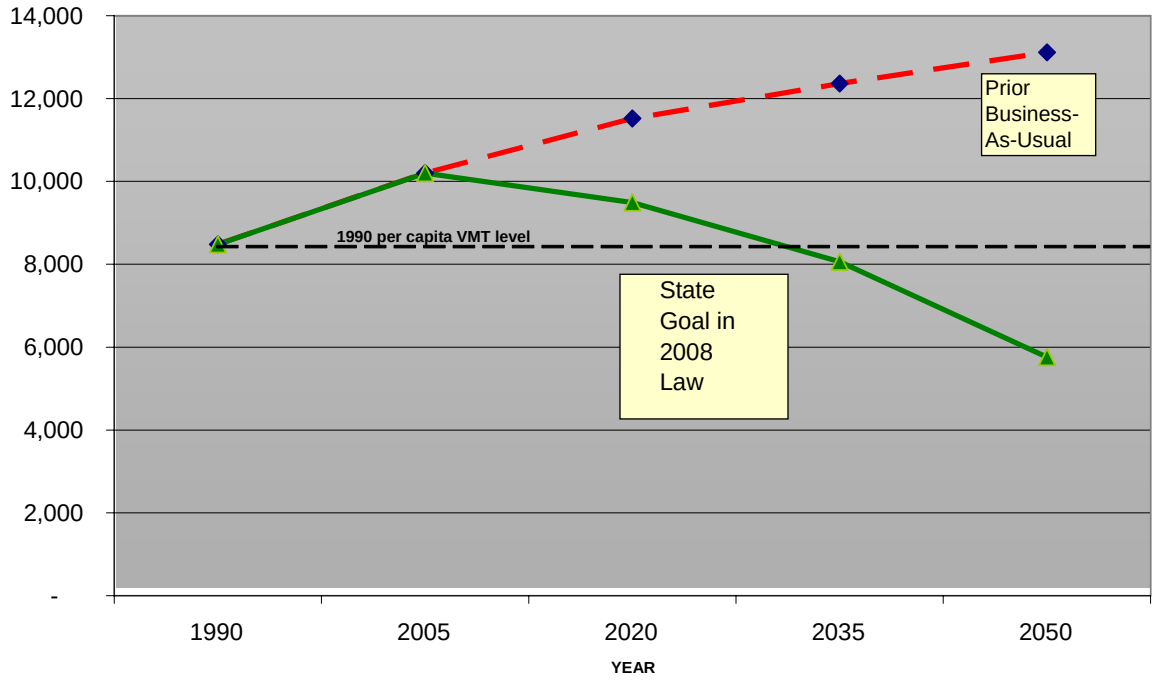


Figure 2:
Per Capita VMT: Washington State
Business-As-Usual vs. Goal in 2008 State Law



In California and 12 other states around the country, more stringent GHG emissions standards for cars and light trucks have been adopted to accelerate this shift. Additionally, continuing and new efforts in California to enhance development and marketing of alternative fuel vehicles, plus efforts to establish a low-carbon fuel standard, are all accelerating the state's transition to a lower carbon fleet. Despite these efforts and advances, though, California is likely to fall short of sufficiently reducing the transportation sectors share of GHG emissions to meet AB 32 goals if it relies only on fuel and technology improvements.

Steve Winkelman of the Center for Clean Air Policy has estimated that anticipated GHG reductions from a California low-carbon fuel standard and from the Pavley GHG emissions standard for new passenger vehicles and light-duty trucks will bring the transportation sector's emissions to below 1990 levels by 2020 if there is no increase in vehicle miles traveled. However, the California Energy Commission forecasts a steady increase in VMT. CCAP estimates that forecasted VMT increases will substantially reduce the positive effects of technology and fuel improvements. VMT increases will prevent the transportation sector from achieving its share of AB 32 goals. Indeed, under the most optimistic scenario, emissions from the transportation sector will only begin to get to 1990 levels just before 2030 if VMT growth trends continue. Under a less optimistic scenario, carbon dioxide levels from the transportation sector will be 17 percent above 1990 levels in 2030, according to CCAP calculations.

Reducing VMT by 30 percent overall, or by 8 percent per capita, by 2020 would help flatten the growth curve of VMT in California, according to CCAP, and assure that the benefits of new technology and fuels would be felt, including an advanced form of the Pavley standards. California could then reach its GHG goals for 2020 in the transportation sector. By 2030, if the VMT reduction trend continued, California could bring its transportation sector GHGs to a level that is 24 percent below 1990 levels.

PLANNING AND EVALUATING NATIONAL VMT GOALS

Many anticipate that upcoming national climate and transportation legislation may include specific goals and incentives for reducing GHG emissions by managing travel growth and boosting system efficiency. Several national transportation study commissions are underway or have recently produced recommendations, calling for a clearer sense of national purpose for transportation programs, tying funding to performance, and increasing accountability to environmental or other system management goals. The legislative opportunities at the federal level and the supportive environment at the state and local level in leading jurisdictions provide a rare timely opportunity to develop a new framework transportation system investment, planning, and operations, tied to achievement of GHG and other system management goals.

Realism is needed to establish goals that are suited to the policy needs, sensitive to cost-effectiveness, and achievable within evolving political realities, making use of readily anticipated technological and managerial innovation in the transportation sector. But a fuller exploration of appropriate VMT reduction goals is needed. Are VMT goals recently put forward by AASHTO and CCAP sufficiently ambitious in exploring the potential and need for traffic management to contribute to GHG reduction?

Science continues to move towards finding that faster action is needed to limit GHGs to a 350 ppm rather than a 450 ppm as an atmospheric CO2 stabilization target.[(xiii)] Growing concerns are

being raised worldwide about the impact of biofuels on food prices.[xiv] Recent studies have shown that many first generation biofuels actually increase GHGs.[15] The automobile industry may face challenges in retooling to quickly boost fuel economy far beyond the California Pavley regulations while dealing with its legacy costs. Thus, the technology and fuel GHG reductions assumed by AASHTO and CCAP may prove to be unachievable. Could or should VMT reduction play a larger role in addressing the GHG challenge? What would be the effect on GHGs?

There is a growing consensus among transportation policy makers and experts that sometime between 2015 and 2025 the United States may need to shift to a system of distance-based road user fees to finance surface transportation, following trends in other advanced developed economies worldwide. This transition will offer new opportunities for managing traffic growth. DOE forecasts of VMT growth do not account for a transition to such VMT fees, nor adoption of likely innovations as pay-as-you-drive insurance, nor wider availability of transit, walking, and cycling options, nor enhanced telecommunications, yet all have potential to cut VMT.

Some may argue that more ambitious VMT reduction goals would hurt the economy and consumers, but many of these innovations are likely to provide attractive cost-savings for the economy and consumers, helping them to reduce the now costly economic burden of car-dependence. A recent report by the Brookings Institution's Hamilton Project, for example, estimated that mileage based car insurance alone could cut driving by 8% nationwide, while cutting car insurance costs for two-thirds of households, with an average annual savings for these households of $270 per vehicle, with the biggest savings for those of low and moderate income.[xv] Households with access to public transportation spend far less on transportation than households without transit access. The co-benefits of reducing traffic growth could be considerable in avoided costs for infrastructure, reduced dependence on foreign oil, improved public health, and increased metropolitan spatial economic efficiency, ultimately enhancing U.S. economic competitiveness at a time of continuing high oil prices.

The VMT reduction goals adopted by Washington State should be seen as an exemplary model for state climate action plans. National VMT reduction targets, if adopted, are likely to be set at a more modest level in recognition of the greater challenges faced by various states, especially ones that are growing more slowly and hence have fewer opportunities to modify average VMT per unit of development through smarter growth.

PROPOSED CLIMATE SENSITIVE TRANSPORTATION MANAGEMENT POLICY

This paper postulates and examines five possible national VMT targets, ranging from Business as Usual to a proposed "Climate Sensitive Transportation Management" (CSTM) policy that would stabilize national VMT at 2010 projected levels through 2050. The definitions of these scenarios are shown in Table 1.

A CSTM policy would mean accommodating population and employment growth through improved spatial efficiency, expanded travel choices, and increased vehicle occupancy. CSTM would bring per capita VMT back to 2000 levels by 2020 (bringing about a 9% decrease in per capita VMT from today by 2020) as the nation's population continues to grow with stabilized traffic levels. It would cut per capita VMT by 18% below 2010 levels by 2030, achieving a 36% reduction in per capita VMT should the nation grow as projected to 420 million by 2050. This

Table 1: Definition of scenarios

Scenario 1:	Business As Usual - VMT projection follows AEO 2008, with EISA fuel economy standard (35 mpg by 2020), and Renewable Fuel Standard (36 billion gallons of biofuel by 2022).
Scenario 2:	AASHTO Vision - 50% of projected growth rate in VMT to 2050
Scenario 3:	CSTM-2020 cap with post 2030 reduction of 0.5% in VMT/person and 50% of growth 2010-2020 ("CSTM Light")
Scenario 4:	CSTM-2015 cap with post 2030 reduction of 1% in VMT/person and 50% of growth 2010-2015
Scenario 5:	"CSTM-Climate Sensitive Transportation Management": 2010 cap through 2050
CPT:	Climate Protection Targets (80% reduction by 2050)

would result in 2050 VMT that is 52% of the Business-as-Usual US DOE Annual Energy Outlook 2008 Forecast for 2050, 2.8 trillion VMT vs. 5.5 trillion VMT. DOE's Annual Energy Outlook 2008 projects a 3% increase in VMT from 2005 to 2010. The proposed CSTM policy could achieve 25.3 $GtCO_2e$ cumulative light vehicle GHG reductions, as shown in Table 2.

Table 2: Effects of Climate Sensitive Transportation Policy on GHGs Over Time

	Cumulative LDV emissions from 2010, $GtCO_2e$	Cumulative reductions With respect to Business As Usual (EISA), $GtCO_2e$		Reductions from CSTM vs. what's needed to achieve Climate Protection Targets of 80% GHG Reduction
		Climate Sensitive Transportation Management (CSTM) Policy	Climate Protection Targets	
2012	5.0	0.1	0.1	126%
2017	13.6	1.0	0.7	141%
2020	18.8	2.0	1.5	135%
2022	22.2	2.9	2.3	127%
2025	27.5	4.3	3.9	111%
2030	36.4	7.3	7.7	95%
2040	55.5	15.1	19.0	79%
2050	77.0	25.3	35.8	71%

The CSTM policy would cut light vehicle emissions in 2050 to 1.1 $GtCO_2e$/year. This would achieve about 71% of the cumulative GHG reduction needed to achieve stringent climate protective targets of 80% reductions by 2050, leaving 29% additional GHG reductions to be achieved from increased fuel and vehicle carbon efficiency above the targets now set in federal law. While many factors would need to be considered in determining the emission limit for each sector, here we assume that the light duty sector would control its emissions to the level commensurate with the sector's share of total U.S. GHG emissions and strive to meet an 80% reduction goal by 2050.

In 2030 and 2040, the CSTM would cut cumulative light vehicle emissions by 7.7 and 19 $GtCO_2e$ respectively. As Figure 3 shows, the reductions that could be achieved by this CSTM policy could provide much needed early action reductions slightly greater than the Climate Protection Target in the near term in years prior to 2025. Revisions to the Climate Sensitive Transport Management Policy to actually cut VMT, rather than just cap it, might be considered later if sufficient progress is not being made to reduce GHGs through technology and fuels approaches, or if deeper GHG reductions are seen as necessary to meet a 350 ppm CO2 atmospheric stabilization target for climate protection.

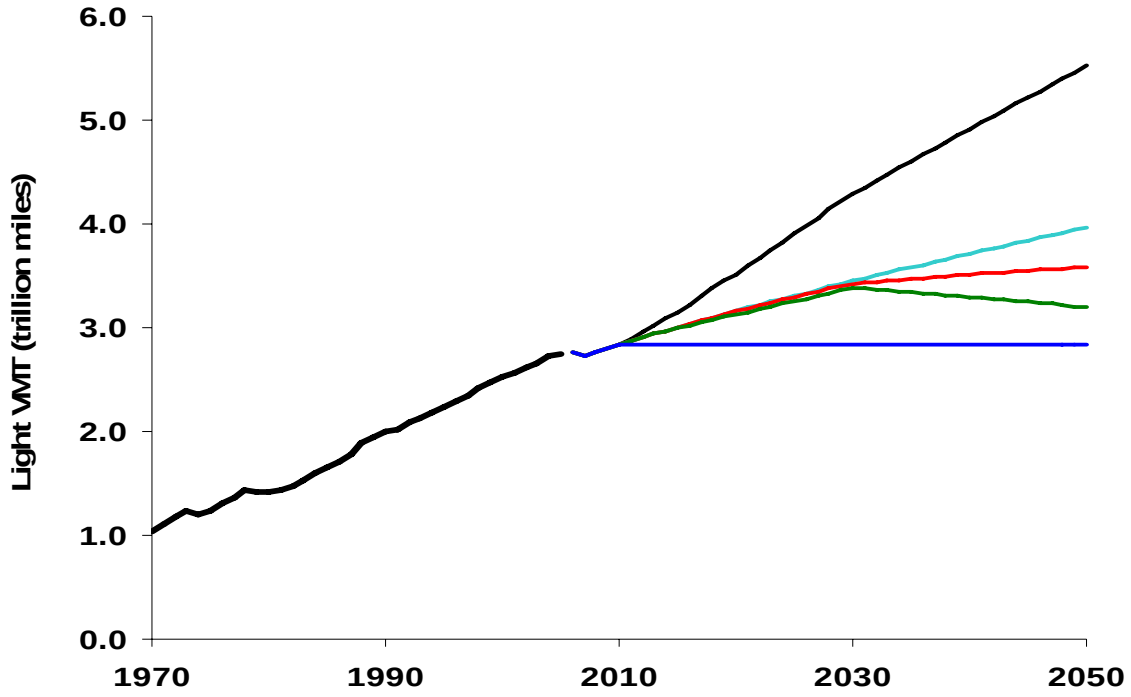
The authors analyzed the effect of several other alternative VMT management strategies. The AASHTO vision policy, for example, might cut the VMT growth rate by half from the current forecast from 2010 until 2050. This policy would produce 3.97 trillion light duty VMT in 2050, and cut cumulative GHGs by 2050 by only 15.4 $GtCO_2e$, which is 39% less than the CSTM policy. If emission reductions are shared equally by sectors, under the AASHTO vision, motor vehicle manufacturers and petroleum refiners would be left responsible for addressing a much larger share of the GHG reduction obligation related to transportation. Alternatively other economic sectors would bear this burden or greenhouse gas management plans would fail.

There is a significant benefit to early action to reduce VMT for climate protection, particularly when it can help reduce costly infrastructure investments in highways and car-dependent sprawl that risks becoming stranded investments at a time of growing fiscal challenges to the U.S. economy. The CSTP may be most beneficial in helping to foster early action.

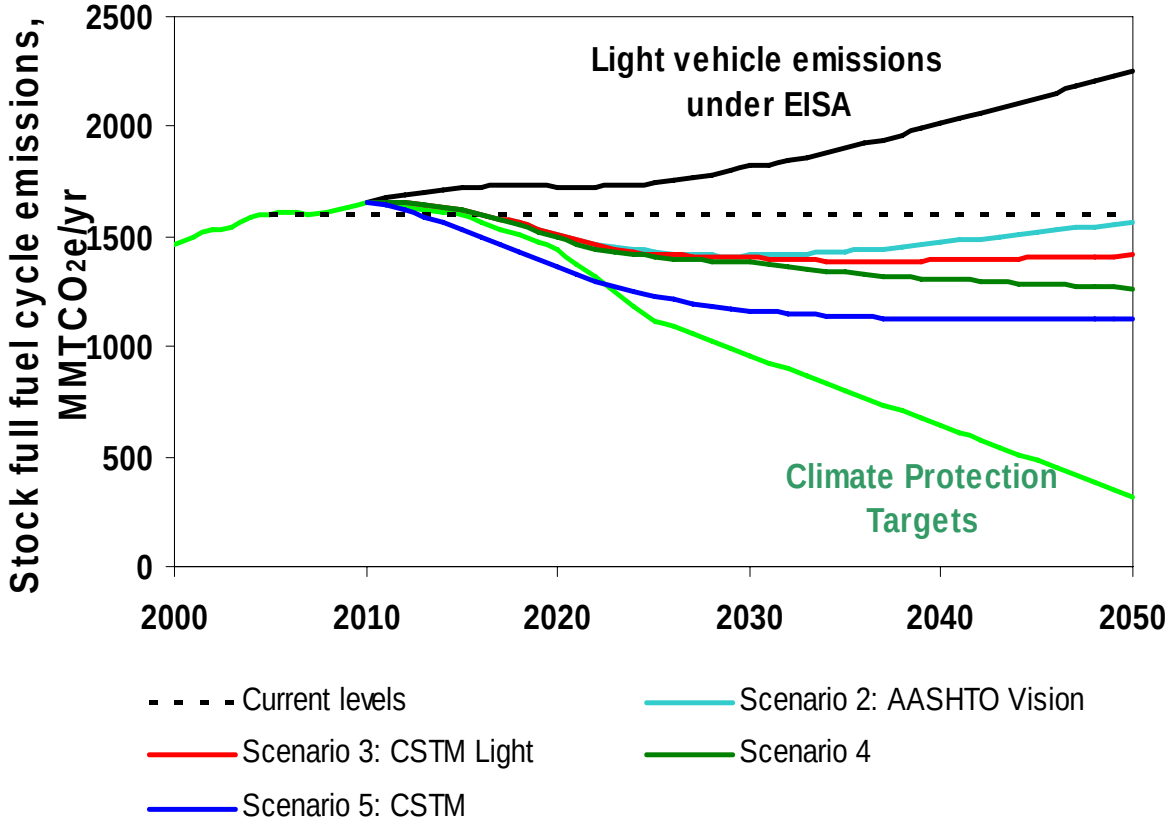
With U.S. transportation funding in crisis, there are opportunities for the road and transit industry to consider how state and local agencies might become eligible for a portion of revenues from the auction of cap-and-trade allowances or from carbon taxes on transportation fuels to enable investments in strategies, plans, and programs that will reduce traffic and GHG pollution. This could provide strong mutual benefits for transportation and climate policy, but would require better system monitoring, performance requirements, and oversight.

Table 3: Effects of AASHTO Vision Scenario on GHGs Over Time (Including EISA CAFÉ & RFS)

	Cumulative LDV FFC GHG emissions (GtCO2e, from 2010)			Cumulative reductions compared to BAU		Reductions from AASHTO vs. what's needed to achieve CPT
	BAU	AASHTO	Climate Protection Targets (CPT)	AASHTO	CPT	
2010	1.7	1.7	1.7	0.0	0.0	
2020	18.8	17.6	17.3	1.1	1.5	76%
2030	36.4	32.0	28.6	4.4	7.7	57%
2040	55.5	46.4	36.5	9.2	19.0	48%
2050	77.0	61.6	41.1	15.4	35.8	43%



Figures 3: Light duty VMT and GHG Impacts With Fuel and Vehicle Efficiency Standards



CONCLUSION

Greenhouse gas planning will present transportation planners and policy makers with new challenges and opportunities. Air quality conformity planning has focused solely on estimating emissions at a particular time from motor vehicles in confined areas. GHG planning will require an analysis of cumulative motor vehicle emissions over time resulting from different policy and investment choices over entire states, nations, and our home planet, Earth. It is the total accumulation of CO2 and other GHGs in the atmosphere over a period of decades that affect the degree of planetary warming and the effectiveness of GHG mitigation strategies.

As this paper illustrates, tools exist to evaluate these cumulative emissions as a function of different projected or desired targets for traffic management, motor vehicle fleet characteristics, and fuels policies. It is a matter of some urgency that these tools begin to be employed as part of not just state, local, and federal climate change planning, but also as a part of a more integrated transportation, land use, and natural resource planning process. Only by measuring and forecasting the implications of our choices will we be capable of making informed and wise stewardship decisions to protect the legacy we bequeath to future generations.

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