Congestion, VMT, and Public Policy
Discussion Paper for a Transportation Symposium

Prepared by: Terry Moore, Senior Research Faculty at the National Center for Smart Growth Research and Education at the University of Maryland*

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*The views expressed do not necessarily represent those of the National Center for Smart Growth, the Maryland Department of Transportation, the Maryland Department of the Environment, or the State of Maryland.

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Executive Summary

This paper provides background information for the symposium *Moving Maryland – A Symposium on Transportation, Growth, and the Economy*. The symposium is sponsored by the Maryland Department of Transportation, the Maryland Department of the Environment, and the University of Maryland. The paper focuses on two transportation issues of current and critical interest in Maryland and the nation: (1) congestion and (2) the level and rate of growth of vehicle-miles traveled (VMT), both of which have effects on the economy, the environment, and the health of our communities.

This paper is written for a broad audience: for anyone interested in transportation policy in Maryland regardless of technical background. It starts with a general framework for thinking about transportation policy, describes trends in congestion and VMT in Maryland and the nation, and ends with a discussion of the kinds of issues likely to be debated as part of the State's efforts to identify, define, and adopt policies to influence congestion, VMT, and their effects. It attempts to assemble information useful to a discussion of policies related to those issues: it is not a response to specific existing or pending legislation, nor does it make recommendations about specific policies.

The paper's main points, in summary, are:

- **Transportation planning and policy have multiple objectives.** It is no longer sufficient, if it ever was, to evaluate just the transportation performance of transportation projects, policies, or programs (e.g., on speed, delay, reliability, safety, direct cost). An evaluation must consider on at least equal footing the effects that such transportation actions have on other things that the public cares about: economic development, land use patterns, environmental quality, climate change, and other aspects of quality of life.
- **To meet those objectives transportation policy-makers are increasingly adopting policies to manage travel demand.** Most transportation agencies acknowledge that "we can't build our way out of congestion." A combination of unremitting congestion, increased travel cost (partially fueled by prices of fuel), concerns about climate change and the environment in general, and funding constraints are all forcing policy-makers and implementing agencies to focus on how to make better use of the transportation infrastructure that we already have.
- **Two key transportation objectives are to reduce congestion and reduce transportation's contributions to greenhouse gas emissions.** Regarding congestion, despite the tremendous investments made in roadway capacity, it continues to be a growing problem for every metropolitan area in the U.S. Many studies have demonstrated empirically what most see as a common-sense

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conclusion: too much congestion is bad; it reduces economic output and contributes to many problems that reduce other aspects of quality of life (e.g., risk of crashes, reduction in travel reliability, time delays, air emissions, greenhouse gases). Regarding greenhouse gas emissions, a relatively well-accepted causal chain—climate change results from greenhouse gases, which result from burning fossil fuel, about 1/3 of which is burned by the transportation sector, about 80% of which is burned by vehicles on roads—leads many people to conclude that one way to reduce those emissions is to reduce the number of vehicle-miles traveled (VMT): absolutely if possible, but at least relative to what they would have been in the absence of new policies to reduce them.

- **For many reasons, evaluating different policy responses to congestion and VMT is difficult.** Not all objectives for a good transportation system can be maximized simultaneously: there are tradeoffs. Increasing requirements that transportation consider its impacts—positive and negative–on public objectives beyond those for transportation increases the tradeoffs and complicates the evaluation. Theoretical arguments and data to support them can be marshaled for any alternative course of action. Better models, by themselves, will not put an end to policy debates: a formula is unlikely to provide a politically acceptable and binding solution. Technical analysis can aid decisions; it cannot make them.
- **Nothing about Maryland's economy, demographics, landscape, building patterns, or policies has caused it to diverge in any significant way from national trends in congestion and VMT.** In both Maryland and the nation, congestion and VMT have grown unremittingly for decades, and have only recently shown some evidence of slowing their rate of growth.
- **There is strong support in the professional literature that traffic congestion in metropolitan areas, beyond some low base level, reduces economic growth; for VMT, the relationship is less obvious.** If high levels of congestion are inefficient then they must, by definition, be reducing economic welfare in the aggregate. Policies to reduce congestion to efficient levels should benefit the economy

  For VMT, there is less agreement on overall economic effects. Opponents of VMT targets note that VMT is highly correlated with GDP and is a measure of our ability to get to places we value. They believe reducing air emissions is important, but that there are better ways (vehicle and engine technology) to get such reductions, and that transportation policy should focus more on reducing delay (congestion). Advocates of VMT targets believe it is appropriate, at a minimum, to have policies that encourage the voluntary reduction of VMT (e.g., improvements to alternative modes of transportation); most also would favor more incentives and even direct regulation. They note recent reductions in VMT per capita and that other countries show that GDP and quality of life can be maintained at lower levels of per capita VMT. Even if there is short-run economic pain, it is less than what it would be if climate change continues unabated.

  One should not expect any amount of analysis to bring these groups to consensus on the issue of economic impacts. Their perspectives on the likely future and the role of policy in a market economy are fundamentally different. They disagree about how much economic loss mandatory VMT reductions will cause now, and whether the future benefits of any present losses will be more than offset by avoided economic losses in the future that come from trying to cope with worsening emissions and climate change.

- **Some considerations for public policies aimed at congestion:**
  - Urban congestion has grown substantially. It can often be temporarily reduced by building new capacity, but that new capacity has become increasingly expensive and decreasingly effective in reducing congestion: in metropolitan areas a ubiquitous network of highways and arterials means that most of the important roads have been built and that additions to capacity in a built urban area are more expensive.
  - Congestion is better addressed through demand management (incentives or regulations that influence how and how much people drive; for example, the pricing of parking). The most effective of the demand-management tools is pricing, and the most effective of the pricing tools is congestion pricing.
  - Properly implemented, congestion pricing has the advantages of (1) reducing inefficient trips (the ones not valuable enough for a driver to make if he or she has to pay their full costs), (2) generating revenue to improve the highway or transit system and to address concerns about the effects of pricing on classes deemed to merit special treatment, and (3) showing where people think travel is valuable (i.e., where they show that they are willing to pay tolls) and, thus, where we should spend our limited resources for building new capacity.
  - Congesting pricing is still rare in the U.S., though we are approaching it faster than most observers 15 years ago thought we would. To address congestion and VMT, policy-makers are more likely to look first to a combination of land use policies, investments in alternative modes, and some partial pricing policies (e.g., new or increased parking fees).
  - A combination of congestion pricing, other demand management techniques, targeted expansion of highways where strong congestion or willingness to pay suggests that user benefits will exceed construction costs, investments in alternative modes of transportation, and certain land use policies is a reasonable package of policies for address congestion in metropolitan areas.
- **Some considerations for public policies aimed at VMT:**
  - There is more agreement that congestion should be reduced than that VMT should be reduced. There are thoughtful, informed, and committed people on both sides of the argument about whether the reduction of VMT, per se, is a good objective for public policy.
  - How a VMT target gets defined will have a big effect on how likely it is to be hit. If standard forecasts of population and employment growth in the U.S. are approximately correct, it will be difficult to keep total VMT from growing. Holding constant or reducing per capita VMT is an easier target, even without policy changes: almost everyone who wants a car already has one, real fuel prices are more likely to rise than fall, the drivers in the bulge of baby-boomers are reaching an age when driving many or any miles will be less possible, and market forces and policy may cause a reduction in the long-run trend toward suburbanization and lower-density development.
  - The term “VMT targets” leads some people to presume that the targets would be achieved by direct regulation of VMT. There are ways to do that (odd-even driving days based on license-plate numbers, monitoring odometers, purposely not investing in congestion relief), but these methods would be difficult to implement, and there would be questions about their net benefits.
  - Thus, policy is not likely to try to hit VMT targets with direct restrictions on VMT, but with incentives and restrictions on things that are presumed, respectively, to reduce or to contribute to VMT: for example, land development patterns,

transportation systems (highways and alternative modes), and transportation prices. In that sense, adopting targets to reduce VMT may be, most importantly, a statement of an overall policy direction, and secondarily a metric of progress (among many). But progress toward the targets—and more importantly, toward changes in the negative effects correlated with VMT (e.g., GHG emissions, depletion of scarce fuel resources, dispersed land-use patterns)—will best be made by policies aimed at reducing those negative effects by other means (e.g., pollution taxes, fuel taxes, land-use policies).

1 INTRODUCTION

The challenges for surface transportation—for streets and highways; for motorized vehicles, non-motorized vehicles, and pedestrians—are well known. For over a century the United States and Maryland have seen travel and congestion increase unabated. For decades, infrastructure improvements have not kept pace with this increase. Today, across America, most of the obvious and easy highways and roads have already been built; any new capacity is increasingly expensive (it is in more difficult, denser areas and built to higher standards) and decreasingly effective at reducing congestion (diminishing returns to new lane miles). Where cost-effective opportunities for new capacity do exist, funding is scarce relative to demand.

Unlike 20 years ago, it is now common for transportation agencies to acknowledge that "we can't build our way out of congestion." That acknowledgment does not mean that no new construction will be useful, and it has not changed the fact that a big part of the debate about transportation expenditures is about projects aimed at expanding transportation capacity. But it does signal a change. A combination of unremitting congestion, increased travel cost (partially fueled by prices of fuel), concerns about climate change and greenhouse gases, and funding constraints are all forcing policy-makers and implementing agencies to focus on how to make better use of the transportation infrastructure that we already have. Transportation policies of this type include:

- **Transportation system management.** Basic changes (e.g., signal timing, road geometry) and advanced ones ("intelligent transportation systems") that allow existing capacity to handle more traffic or to move it faster or more predictably.
- **Travel demand management.** Policies that reduce or redistribute travel and trips on the highway system (e.g., parking management, tolls and other charges, high-occupancy and truck lanes).
- **Expansion of facilities for alternative modes.** Demand management of automobile and truck travel will be more effective technically and politically if alternatives are available and convenient (e.g., carpool/vanpool programs; telecommuting; new facilities for transit, bike, pedestrian, and freight movement).

In addition to addressing transportation problems with transportation solutions, policy-makers also are looking outside of transportation for solutions that might address the underlying causes of demand for travel and transportation facilities. Economic growth clearly contributes to travel demand and the problems it creates,[2] but there are few instances of an elected body adopting policies whose direct purpose is to reduce economic growth, and many policies to address other problems fail to gain support because of their potential to reduce economic growth as a side effect. More acceptable, but not uncontroversial, are land use policies. How we arrange our land uses (their location, diversity, density, and design) affects how transportation is or could be provided to serve it. An assumption, often unstated, is that such rearrangement is more efficient and does not come at the expense of economic growth.

Within travel demand management policies, increasing attention has been paid in the last few years to those that might directly reduce **congestion** and **vehicle miles traveled (VMT)**. Both topics are part of an extensive debate nationally and in many states.[3] MDOT's 2009 *Attainment Report* addresses both congestion and VMT as measures of performance. The *Maryland Transportation Plan* mentions both congestion pricing and VMT.

The reasons for the attention to these topics are straightforward. A fundamental objective of transportation investment and policy is the cost-effective reduction of travel time—of wasteful delay (congestion). Proponents of policies to reduce VMT have a clear rationale for those policies: if people drove less, then congestion, fuel consumption, dependence on foreign oil, emissions, and construction and maintenance costs would all be reduced. Congestion and VMT are clearly linked: reducing VMT will reduce congestion (other things being equal). But some policies to reduce congestion (e.g., tolling based on the level of congestion) will reduce VMT, while others (e.g., building new capacity) will not.

In short, for reasons related not only to transportation performance, but also to economic development, air quality, water quality, land-use efficiency, and other aspects of quality of life, a lot of attention is being directed to reducing travel (specifically, VMT) and the congestion that travel creates.

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[2] And an effect: causality is bi-directional and hard to disentangle.

[3] The Clean Energy Jobs and American Power Act, Sections 112 and 113 of S 1173, as well as proposed transportation authorization legislation developed by the House Transportation and Infrastructure Committee, each have provisions calling for States and metropolitan planning organizations to establish state and regional targets and strategies for reducing transportation-related GHG emissions as part of their transportation planning processes. Reductions in VMT could be proposed as an appropriate area to establish such targets and strategies should these proposed bills be signed into law. Both California and Washington have adopted legislation that targets reductions in certain measures of VMT.

Any of the potential benefits of reducing congestion or VMT come with costs. The most obvious costs are the direct ones of adopting and implementing the policies presumed to achieve these reductions. Simply asking people to drive less produces, at best, only small and temporary changes; some form of incentive or regulation is required to get the desired reductions. More transit capacity coupled with supportive land use changes could move in the direction of reducing the growth in VMT; not building new highway capacity would eventually have the effect of reducing the growth of VMT; tolls would act more quickly; outright restrictions on driving are theoretically possible.

But there are also potential indirect costs: the subsequent effects such reductions (if achieved) may have on other things people care about (e.g., the economy, the environment, cost of living). The indirect costs may be large (e.g., the political and economic costs of direct restrictions on driving).

A fundamental and controversial impact is on economic activity. Given the importance of moving people and goods to the places they need to be for the production of marketable goods and services, won't reducing travel have negative impacts on economic activity? Or are such reductions ultimately good for the economy because, for example, they reduce some market inefficiencies and may ameliorate longer-run economic problems driven by higher fuel prices and congestion? Or, are such reductions more appropriately viewed more neutrally—as an unavoidable consequence of other policies aimed at preserving and enhancing our economic, environmental, and social quality life? Regardless, if such policies were adopted to reduce the amount of vehicular travel or its rate of growth, how could that be done in ways that would not adversely affect travelers and freight movement?

Without a discussion of questions like these and others about different forms of demand management, there will not be agreement on their consequences. Without agreement on some aspects of these issues, adopting appropriate policies will be impossible. The purpose of MDOT's symposium *Moving Maryland: Transportation, Growth, and the Economy* and of this white paper is to continue to move the discussion forward. This white paper does that in three parts:

- **A Framework for Evaluating Transportation Policy**. Ultimately the goal is action. Agreeing on action requires discussion. A productive discussion of policy requires some agreement about definitions and about cause and effect: if we want *X*, how likely is it that *Y* will get us there and do so cost effectively? It also requires awareness of differences in values, needs, and expectations among Maryland citizens and businesses regarding transportation. This section describes some of the key relationships, making the case that they are many and complex.

- **Congestion and VMT in Maryland**. This section provides some data about what is happening in Maryland compared to the rest of the nation.
- **Evaluating Policies to Address Congestion and VMT.** Given the importance of congestion and VMT to the performance of the transportation system and to the attainment of other state and local goals that are affected by the performance of the transportation system, it is reasonable to expect them to be key topics in debates about state transportation policy and investment. This section discusses some definitions and principles that are central to that debate.

2 A FRAMEWORK FOR EVALUATING TRANSPORTATION POLICY

2.1 EVALUATING TRANSPORTATION POLICY IN THE CONTEXT OF POLICY OBJECTIVES

At the most basic level, the objective of transportation planning and investment is to deliver a good transportation system. But what does "good" mean? At a broad level, there is consensus among policy-makers, technicians, and the public that transportation systems should typically be:

- Safe
- Quick
- Reliable
- Convenient
- Inexpensive (or, cost effective)
- Supportive of, or not detrimental to, other policy objectives such as ones relating to the economy, the environment, and their mutual sustainability.[4]

The first four objectives are about the performance of transportation itself. The last two are about things that get affected as society takes actions to get more of the desired benefits from the transportation system: direct costs (e.g., money spent for

[4] These goals can probably be found, in slightly different words, in every state and metropolitan transportation plan. In the *2009 Maryland Transportation Plan* they are: safety and security, system performance and quality of service (quick, reliable, convenient), system preservation (an aspect of cost effectiveness), environmental stewardship and connectivity to daily life (other, non-transportation objectives).

construction, operation, and maintenance of the transportation system), and impacts (positive and negative) on other things people care about (e.g., the economy, the environment, or, even more broadly, quality of life). Ideally, policy-makers try to select projects that deliver transportation and other benefits that exceed monetary and other costs (i.e., that have net benefits when everything is accounted for).

Moreover, transportation systems should have all these desirable attributes for travelers of all types: households and businesses, people and freight, independent of mode, location, income, or other socio-economic or demographic characteristics (sometimes referred to as *equity*). In short, a good transportation system is one that works well (is efficient and cost effective, considering both its transportation and non-transportation impacts) and is fair (a normative judgment about whether people are paying or benefiting in a way that seems appropriate to their circumstances).

These attributes of a good transportation project or policy are (or should be) the basis for any evaluation of transportation projects or policies. They are *goals* and simultaneously categories of *performance measures* or *evaluation criteria.*[5]

Consider, however, some problems that arise as one tries to select from among competing transportation policies the ones that are most efficient and most fair:

- **Not all objectives for a good transportation system can be maximized simultaneously: there are tradeoffs.** We can't have the most of everything. For example, do we want low cost or high travel performance? The more trips we try to squeeze through the existing system—to reduce costs—the more likely that speed will be reduced on average, and reduced substantially on some days—i.e., travel-time reliability is reduced). Another example: there will be more good projects than there is money to build them, and no DOT or MPO has found (or is likely to find) an unassailable way to value the relative merits of road, transit, bicycle, and pedestrian projects and programs. There will always be a political process to try to accommodate concerns about fairness across modes and geography.
- **Increasing requirements that transportation consider its impacts—positive and negative–on public objectives beyond those for transportation increases the tradeoffs and complicates the evaluation.**

[5] In planning parlance it is generally accepted that terms like *goals, fundamentals,* and *outcomes* are used to talk broadly about categories of impacts, and terms like *performance measures* and *evaluation criteria* are used as analysts get more specific about what is going to get measured to make an estimate of impacts of interest and a determination of how different investments, programs, or regulations rate relative to one another.

People want quality of life: for example, economic, environmental, social, and cultural quality.[6] The efficiency and fairness of their transportation system is one of only dozens of public and private services they care about. It may be that people care more about the secondary benefits or direct environmental impacts of transportation projects than about the transportation benefits those projects are trying to deliver. That points to an important distinction and occasional confusion in evaluating transportation investments and policies:

- **Evaluation of the transportation performance of the transportation system**. Examples of typical categories of system performance:
  - Safety (measured by crash rates, fatalities)
  - Travel volume (measured by vehicles, VMT)
  - Speed (measured by congestion, travel time, delay).

  These are the kinds of measures that one finds in MDOT's *Annual Attainment Report on Transportation System Performance.*

- **Evaluation of the impacts of transportation on other public objectives**. Examples of typical categories (and examples of measures):
  - Economic development (measured as gross regional product, income, employment)
  - Land use (density measured at either or both the regional and the neighborhood level)
  - Emissions, air quality, greenhouse gases, water quality, habitat quality (measured directly or as a correlate of other factors like VMT or amount of new impervious surface)
  - Energy use (measured as fleet efficiency (mpg), mode split (share of trips by transit, bike, and walk), or as a correlate of VMT).

  It is no longer enough for transportation planners and policy-makers to be experts in transportation: they have to bring in expertise from many other fields, and then find ways to compare many measurements of many different concerns so that optimal transportation policies can be

[6] The mission statement of Maryland's 2009 Transportation Plan: "Enhance the quality of life for Maryland's citizens by providing a balanced and sustainable multimodal transportation system." Also "…a seamless transportation system that supports Maryland's economy and enhances the quality of life for all Marylanders." The plan has multiple objectives (including environmental stewardship and equity), many outside of transportation and the presumed outcomes of an efficient and fair transportation system.

chosen. MDOT, like most other state DOTs, has both transportation and non-transportation objectives in its plan.[7]

- **The full consequences of transportation policies will always be hard to predict and put a value on.** New models and more data will improve our understanding, but the future is inherently uncertain and so are the benefits and costs we hope to measure. Even well-done and well-documented forecasts of consequences cannot address all the consequences some people will care about (in different areas and sub-areas; for different groups by interest, income, travel demand, mode use, and so on; for now and for various points in the future). It has proved to be an insurmountable technical task for any government (in all but a few large, well-funded endeavors) to develop a scheme for rigorously establishing the relative importance (the weighting) of the many consequences so that they can be compared and summarized, if not summed.

Theoretical arguments and data to support them can be marshaled for any alternative course of action. Better models, by themselves, will not put an end to policy debate: a formula is unlikely to provide a politically acceptable and binding solution. Technical analysis can aid decisions; it cannot make them. The best way for technicians to support a public decision-making process is to provide (1) a framework for discussing benefits and costs (pros and cons) of alternative public actions (including “no action”), and (2) information (data, measurements) about the benefits and costs that such a framework describes.

2.2 Congestion and vehicle-miles traveled (VMT)

The obvious and inevitable emphasis of highway policy for most of the 20th century was on building new capacity. That emphasis changed slowly as more capacity was built. In the 21st century, a growing agreement that capacity solutions have reached diminishing returns (“we can’t build our way out of congestion”) has led to increasing emphasis on:

- Maintenance: preserving the existing system capacity, and doing so efficiently (“lifecycle” evaluation).

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[7] See footnotes 4 and 6. See also *A Sustainable Transportation Agenda at MDOT* (2009) which describes how the five broad policy priorities of the *Maryland Transportation Plan* require MDOT to look beyond transportation performance as it evaluates investments, programs, and regulations.

- Operations, Policies, and Programs: getting more service out of existing road capacity through system management and demand management, including high occupancy vehicle lanes, tolling and congestion pricing.
- Other types of capacity: providing new capacity for travel alternatives other than highways.

Coincident with these broader policy shifts has been an increasing recognition of (1) the limitations of supply-side solutions to problems of metropolitan highway **congestion**, and (2) the contribution of transportation (in particular, **VMT**) to greenhouse gases and consequent climate change as a measure of the success of a transportation system, and as a means regulating the use of that system.

Congestion in metropolitan areas. Many changes—for example, in incomes, technology, demographics, work force characteristics, land uses, consumer preferences—increased the demand for trips on urban roadways in the 20th century. Government was able to stay even with the demand through the 1970s. From 1980 on, most of the factors that would increase congestion grew *faster* than population (e.g., per capita income, licensed drivers, vehicles, people in the labor force, fuel consumption, and VMT), while most of the factors that would have decreased congestion grew *slower* than population (e.g., highway miles, the real price of gasoline, operating cost per mile). The result is that almost every measure of congestion (e.g., annual hours of delay (total and peak period), annual cost of delay, urban areas with more than 20 hours of peak-hour delay per traveler) grew five to ten times faster than population over about the last 30 years.

Some amount of highway congestion is an unavoidable and desirable by-product of good planning and efficient investment: funding constraints will no longer allow, if they ever did, building new capacity that will see only very light use. Heavy use means that people value the places and activities that highways take them to and, by extension, that they value the highways. But many studies have demonstrated empirically what most see as a common-sense conclusion: too much congestion is bad; it reduces economic output[8] and contributes to many problems that reduce other aspects of quality of life (e.g., increases in risk of crashes, air emissions, greenhouse gases).

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[8] E.g., Hymel (2008) "Does Traffic Congestion Reduce Employment Growth?" *Journal of Urban Economics*. "…a 10% increase in congestion, for a city with delay comparable to that of Los Angeles, would reduce subsequent long-run employment growth by 4%….congestion has a broad negative impact on economic growth."

Despite the tremendous investments made in roadway capacity, traffic congestion is a problem for every metropolitan area in the U.S. and has steadily increased for several decades because (a) changes in composition and amount of population and economic activity have created drivers and trips far in excess of what new highway expansion could accommodate; (b) highways are not priced efficiently during congested periods, which would cause shifts in time, location, and mode of travel; and (c) for most household and freight travel, alternative modes are not as convenient, fast, or accessible,. Surveys of people across the country have consistently found that highway congestion is always near the top of the list of the problems of growth. It doesn't persist because of a lack of attention or money—governments at all levels have spent decades and billions of dollars improving urban transportation systems. Despite the prayers, promulgations, and programs, trips outstrip highway capacity. Almost all of the most important and most cost-effective roads have been built. Planners, engineers, and policy-makers have generally joined economists in concluding that some level of congestion in the urban portions of large metropolitan areas is inevitable.

The decreasing effectiveness of supply-side solutions has encouraged consideration of demand-side ones. Those solutions aim at changing traveler behavior so that the existing highway supply can operate more efficiently. Some solutions are regulatory (e.g., ramp metering), but the economists' ideal is pricing: in particular, the targeted pricing of congestion (i.e., pricing by location and time of day).

Climate change, greenhouse gases, and VMT. The problem here is well known, as is its relationship to transportation: climate change is affected by the level of greenhouse gases; human's use of fossil fuels increases greenhouse gases; transportation is responsible for roughly 1/4 to 1/3 of those greenhouse gas emissions; about 80% of transportation emissions come from highway vehicles. Thus, surface transportation is a good place to look as we struggle to reduce those emissions.

The options for reducing emissions fall into two broad categories, each with sub-categories:

- **Technological changes** to:
  - Fuel. Change the characteristics of the fuels we use for trips so that they produce fewer emissions.
  - Vehicles. Improve vehicle energy efficiency, both through incremental improvements in current technology and through transformational new vehicle technologies.

  - Highways and streets. If traffic can flow smoother, it will generate less emissions per mile, other things equal. Examples: tolling to reduce congestion, technology to moderate and stabilize speeds, synchronized traffic signals, roundabouts, anti-idling programs.
  - Construction and maintenance of the highway system. On a life-cycle basis, some analysts suggest that the full carbon footprint of major construction project can generate the equivalent of decades of use by travelers.
- **Behavioral changes**. Find ways to get fewer, shorter, or different types of trips, a category that has many levers:
  - Increase, directly or indirectly, the price of the trip (with the obvious connection to congestion pricing, noted above).
  - Educate drivers to improve driving habits.
  - Change land uses (a long-run strategy).
  - Regulate (e.g., prohibit travel of certain types, in certain places, at certain times).
  - Encourage the use of modes of travel with lower emissions by diversifying the transportation system and providing more and improved options for those modes (e.g., designing "complete streets" to encourage transit, bike, and pedestrian trips; improving rail and water transport facilities and operations for freight).

In the context of climate change, the interest in VMT derives from a straightforward assumption about cause and effect: fewer vehicle miles traveled means less fuel consumption and fewer greenhouse gas emissions (other things being equal). At a minimum, monitoring VMT would be an indicator of progress on greenhouse gas emissions. More prescriptively, one way to reduce those emissions would be to adopt and implement policies that have the effect, directly or indirectly, of reducing VMT.

3 Congestion and VMT in Maryland

Nothing about Maryland's economy, demographics, landscape, building patterns, or policies has caused it to diverge in any significant way from national trends in congestion and VMT.

Nationally, congestion has grown unabated in the 439 U.S. urban areas studied by the Texas Transportation Institute (TTI) since the early 1980s. The general conclusion is that since 1982: "trips take longer; congestion affects more of the day; congestion affects weekend travel and rural areas; congestion affects more personal trips and freight shipments; and trip travel times are unreliable."[9] In Maryland, TTI has measurements for only Baltimore and Washington, D.C. (but not the State at large). Baltimore was near the top of the list for growing congestion for cities with populations between one and three million. Washington, D.C. saw its delay per peak traveler grow faster than the average for cities over three million. Other sources rank Maryland fifth worst in the nation for congestion on urban interstates (69% of the urban interstate miles were rated as congested in 2005).[10] MDOT reports that at the aggregate level certain measures of congestion[11] have not grown in the State since 2002.

The more travel increases and is concentrated geographically, the more congestion: thus, one would expect increases in congestion to be accompanied by increases in VMT. At the national level, the trend has been consistently up since consistent measurement began over 35 years ago: 2008 was the first year in that entire period that VMT did not exceed the previous year's total.[12] An analysis of recent national trends for VMT[13] using different data sets found that (1) the growth rate in VMT has slowed, (2) *per capita* VMT began declining around 2005, and (3) changes in VMT are not equal everywhere:

- VMT in rural areas has decreased since 2003, while VMT in urban areas continued to increase until 2008 (a trend consistent with a long-run shift of VMT toward urban areas.[14])
- Heavy trucks account for less than 5% of the VMT; almost 95% is from passenger cars, light trucks, and motorcycles; light trucks (including) SUVs now account for almost 40% of VMT.

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[9] *2009 Urban Mobility Report* from the Texas Transportation Institute, page 21.

[10] Maryland Department of Legislative Services, Office of Policy Analysis, *Congestion in Maryland: A Bumper to Bumper Analysis*, July 2008, page 1.

[11] *2009 Annual Attainment Report*, page 38. Measured as "percent of freeway and arterial lane-miles with average volumes at or above congested levels." This is one measure of congestion, but it would not fully capture a situation in which freeway miles *that are already congested* are becoming more congested (slower travel times and longer congested periods). More refined measures could show increasing amounts of vehicle-hours of delay.

[12] 9 March 2009. United States Department of Transportation, Federal Highway Administration. Accessed 19 October 2009. http://www.fhwa.dot.gov/policyinformation/travel/tvt/history

[13] Puentes and Tomer, *The Road…Less Traveled: An Analysis of Vehicle Miles Traveled Trends in the U.S.*, Brookings, December 2008.

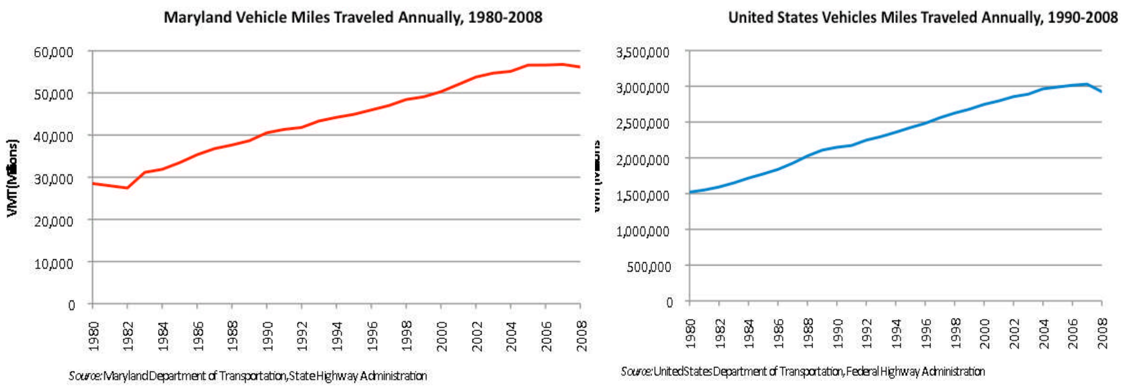
[14] Urban share increased from about 60% in 1991 to about 66% in 2008.

- Over the last 15 years, all states saw growth in VMT, but that growth was faster in southeastern and intermountain western states.

In the face of inexorable growth of total VMT, the optimists among us can shift from a focus on *totals* to one on *rates of change*. The good news is that VMT is not growing as fast as it used to: it grew nationally at an average annual rate of 3.9% between 1985 and 1990, and at 1.7% between 2000 and 2005.[15] Things are getting worse more slowly.

The same report shows Maryland hovering around the national averages for VMT and per capita VMT growth since 1991. Baltimore and Washington, D.C. ranked in the mid-range of VMT per capita on principal arterials among the 100 largest metropolitan areas. MDOT's *2009 Attainment Report* finds that growth in VMT in Maryland stopped in about 2005.[16] Figure 1 suggests visually what the numbers are saying: Maryland's trends in change in VMT have paralleled those of the nation.

Figure 1: Comparison of growth in VMT, Maryland versus US, 1980- 2008



Going forward, one State forecast shows total VMT growing over the next 10 years by around 12 – 22%.[17] Rates of VMT growth are predicted to exceed the rate of population growth, which means that VMT per capita would be increasing.

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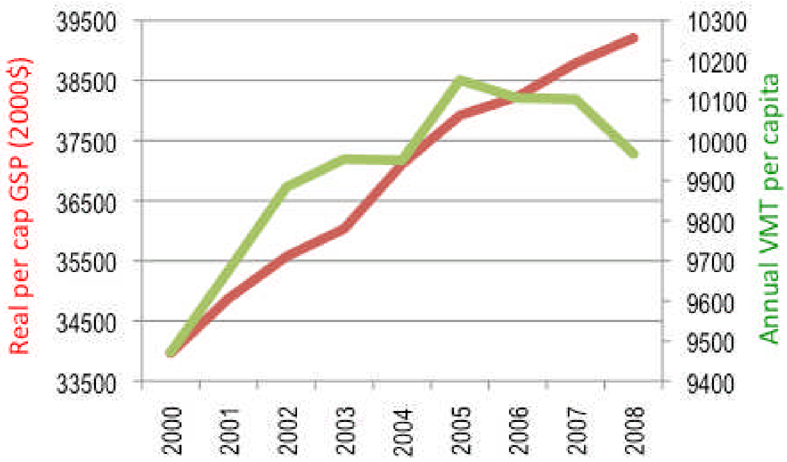
[15] United States Department of Transportation-Federal Highway Administration. *Historical Monthly VMT Report*. 09 March 2009. 19 October 2009. http://www.fhwa.dot.gov/policyinformation/travel/tvt/history

[16] At about 57 billion VMT/year, about 2% of the national total (roughly its percent of national population).

[17]Maryland Energy Administration, *Maryland Comprehensive Energy Outlook*, Chapter 1, Draft, page 18, July. 2009. MDOT, *State Plan on Congestion, (Joint Chairmen's Report, Page 77)*, December 2008, says "The total annual VMT in 2030 is forecast to increase 51 percent over the 2007 annual VMT…. the average annual VMT growth is projected to be over 1.7 percent per year, compared with the forecast population growth of just below 0.8 percent per year." It also estimates that the number of vehicles will grow at twice the rate of population during that period.

Many observers see hope in the recent deflection of the long-run trend of VMT growth. Figure 2 shows that in Maryland (1) the reduction in VMT growth in the last few years, coupled with no estimated change in the rate of population growth, has resulted in a small drop (about 1.8% from the peak in 2005) in *per capita* VMT, and (2) real per capita Gross State Product did not see any decline (anecdotal support for the argument that though growth rates for GDP and VMT have been very highly correlated for a long time, it is possible for GDP to grow even as per capita VMT does not).

Figure 2: Comparison of growth in real per capita Gross State Product to per capita VMT, Maryland, 2000-2008



Source: For population, US Census, http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=01000US&-_box_head_nbr=GCT-T1&-ds_name=PEP_2008_EST&-_lang=en&-format=US-40&-_sse=on. For VMT, MDOT/SHA: http://www.sha.state.md.us/oppen/vehicle_Miles_of_Travel.pdf. For GSP, Bureau of Economic Analysis: http://www.bea.gov/regional/gsp/.

The National Center for Smart Growth looked at the distribution of VMT across Maryland counties. It allocated Maryland's 24 counties to one of three equal groups (high, medium, low) on several variables (total population, population density, total VMT, and VMT per capita) for three time periods (1990, 2000, and 2007). The results:

- Comparing across time on each variable, the counties did not change groups (only two exceptions).
- Comparing across variables on each time period, counties generally had the same ranking in each time period for population, population density, and total VMT. For example, if a county was in the high group on total population, it was very likely to be in the high group on population density (because the differences in the area of counties is much less than the differences in their populations), and on total VMT (more people, more driving). But for VMT per capita, the rankings changed: in general, the counties with a higher ranking on population and density were more likely

to rank in the middle or low group on VMT per capita. That finding is consistent with those of other studies: people in more rural areas tend to drive more miles per capita. People in urban areas may make more trips per capita, but they may be shorter, and more of them are made by alternative modes.

In summary, in both Maryland and the nation, congestion and VMT have grown unremittingly for decades, and have only recently shown some evidence of slowing their rate of growth.

4 Evaluating policies related to congestion and VMT

To summarize the points so far: (1) congestion and VMT will be important topics for all levels of government involved in highway and road planning and policy, but (2) determining what those policies should be is a challenge for many reasons (Section 2.1), and (3) general data about the amount of congestion and VMT describe the problems, but do not give any rigorous guidance on actions to effectively and fairly alleviate those problems (Section 3). This section skips over the data to give a brief description of some of the issues likely to emerge as Maryland debates the merits of policies aimed at reducing congestion or VMT.

What is the objective regarding congestion and VMT?

At first blush, the objective seems obvious to some people: the current levels of congestion and VMT are undesirable so they should be reduced, right? They waste resources, especially fuel and time. If we traveled less, we would waste less time and gas, and be better off.

Or would we…?

Congestion is a measure of our ability to create places where people want to live, work, shop, exercise, and socialize. People, by definition, want to be in places that are congested (otherwise no congestion).[18] Moreover, VMT is a measure of economic activity, and more economic activity means a better economy and more income, other things equal. The relationship between VMT and GDP per capita in the U.S. over the last 60 years is almost perfect: one can be used to predict the other

[18] Yogic wisdom: "Nobody goes there anymore. It's too crowded."

with confidence.[19] VMT and GDP are so closely linked that statistically and definitively establishing what caused what has proved difficult.

No one would expect zero congestion or VMT to be optimal; many believe that current levels are too great. So where in between is the efficient level? We cling to the hope that we can have both: an efficient economy that has the right (efficient) level of congestion and VMT. Maybe we can.

The key to finding an optimum is in to think about what people *do* pay, what they might be *willing to* pay for the transportation performance attributes they desire (e.g., speed, reliability, convenience, choice), and what they *should* pay given their use of the transportation system and their fair share of transportation costs and the external costs (primarily of congestion delay and emissions) that they impose on others. The economics of the highway congestion problem is that drivers are using road capacity that they do not pay the full cost of, at least not as drivers. Both highway and transit users consume more of it than they would if they were paying the full marginal cost (especially the cost of time delay that their use of a congested highway imposes on many other users, but also, for example, the costs of dealing with the results of climate change). That is a clearer definition of the congestion problem, of how to estimate the right amount of congestion (build capacity that drivers in congested areas are willing to pay for in full), and of the kinds of policies that will lead to the right level of congestion (those that charge drivers for the full costs they impose on the transportation network, a very big component of which is the cost of delay, which varies by time and location: hence, the economists' recommendation for some form of congestion pricing).

The problem for evaluating policies to reduce congestion and VMT is that the causal change is complex: such reductions will have the effect of making many others better or worse: it is hard to identify all the consequences, much less estimate and sum them to see if a policy is, on net, beneficial. For example, a big question in the debate about VMT targets is whether reducing VMT is likely to have a negative effect on the economy.

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[19] Liddle (2007) got an R^2 of .985 for this regression, 1946-2004. "Long-Run Relation among Motor Fuel Use, Vehicle Miles Traveled, Income, and Gas Price for the US," paper presented at the 27th USAEE/IAEE North American Conference 'Developing and Delivering Affordable Energy in the 21st Century,' Houston, Texas, 16-19 September.

Congestion, VMT, and the economy

There is strong support in the professional literature that traffic congestion in metropolitan areas, beyond some low base level, reduces economic growth.[20] The relationship has been shown empirically, and it is on solid ground logically: if high levels of congestion are inefficient than they must, by definition, be reducing economic welfare in the aggregate. Policies to reduce congestion to efficient levels should benefit the economy.[21]

For VMT, the relationship is less obvious. Because VMT and GDP are so closely linked, one empirically-demonstrated way to reduce VMT is to have a recession. Or, working the other way, some economists have argued that a good step toward a recession is to have restrictive policies to reduce VMT. The debate extends beyond the confines of academic journals: in play are real policy changes with real consequences that get interest groups engaged.[22] There are strongly held arguments on both sides that can only be summarized here:

- Advocates for highways.[23] VMT is highly correlated with GDP. VMT is a measure of the freedom we have to get places, and of the value we place on that freedom. Reducing air emissions is important, but there are better ways (vehicle and engine technology) to do that. Policy should focus on reducing delay (congestion) and thus on more, and more efficient, facilities (for cars, but for other modes as well). Reductions in the growth of VMT may be a secondary impact of other policies (e.g., emissions standards, investments in transit) but its reduction should not be the primary target.
- Advocates for environmental quality, smart growth, and an alternative transportation paradigm.[24] At a minimum, it is appropriate to have policies

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[20] Congestion from level-of-service A to B may, in fact, be correlated with increases in economic growth, but that is not the type of congestion increase drivers, planners, and policy-makers worry about. Congestion from LOS D to E, or E to F, is the concern.

[21] Note, however, that reducing congestion by building new capacity in areas where travel is significantly underpriced (including on most heavily congested freeways in metropolitan areas) may not increase efficiency: the cost of reducing that congestion for the lower value trips that are causing it probably exceeds what drivers would be willing to pay for that congestion reduction. Efficiency comes by getting the price of travel perceived by drivers closer to cost, and then targeting capacity improvements to places where bad congestion remains despite the corrected prices.

[22] See http://transportation.nationaljournal.com/2009/06/should-reducing-vehicle-miles.php for a blogging battle on the topic with the expected interests arrayed on both sides of the VMT question.

[23] For a good description of the arguments, see a Robert Poole, http://reason.org/news/show/surface-transportation-innovat-70 Sept 2009.

[24] For a recent and readable discussion of the arguments, see Todd Litman, "Are Vehicle Travel Reduction Targets Justified? Evaluating Mobility Management Policy Objectives Such As Targets To Reduce VMT And Increase Use Of Alternative Modes," http://www.vtpi.org/ October 2009.

> that encourage the voluntary reduction of VMT (e.g., improvements to alternative modes of transportation or incentives for different modal choices). Recent reductions in VMT per capita show that it is possible. Other countries show that GDP and quality of life can be maintained at lower levels of per capita VMT. VMT reduction achieves more than one objective: it is likely to be correlated with not only reduced emissions, but also with more efficient development patterns, reduction of energy dependency, and the preservation of farmland and natural areas. Even if there is short-run economic pain, it is less than what it would be if climate change continues unabated.[25]

One should not expect any amount of analysis to bring these groups to consensus on the issue of economic impacts. Their perspectives on the likely future and the role of policy in a market economy are fundamentally different. They disagree about how much economic loss mandatory VMT reductions will cause now, and whether the future benefits of any present losses will be more than offset by avoided economic losses in the future that come from trying to cope with worsening emissions and climate change. In this debate one should expect both (1) broad and theoretical arguments (e.g., about the importance of mobility to the economy and quality of life; about the ultimate unsustainability of that mobility if past trends in driving are extended forward on to reductions in natural endowments and diminishing returns to capacity expansion), and (2) anecdotes about subsets of benefits and costs (e.g., why freight needs mobility now; why if more people lived high-density housing per capita VMT would decrease), but (3) no definitive modeling of and agreement on full system effects over the long run.

Accessibility versus mobility

Transportation planners make the distinction between *mobility* (the ability to move, presumably quickly, safely, and so on) and *accessibility* (the ability for people to get to goods, services, and activities they want, or to get those things to them). The typical and reasonable assumption is that the access matters more and is more fundamental than the mobility. In the electronic world, access is increasingly happening without any mobility: we can get the information services we need without moving ourselves anywhere (but the mobility of electrons on the internet highway becomes more important).

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[25] See the Stern Review (2005) which estimated the costs of dealing with climate change at 1% of GDP, and of not dealing with it at future costs of 5-20% of GDP. www.sternreview.org.uk/

The case for the importance of accessibility can be used to make a case that decreased VMT might not hurt the economy. A fundamental assumption, however, is that there are ways to preserve or increase accessibility even as mobility (roughly measured as VMT or VMT per capita[26]) decreases. That is a big assumption, usually based on some version of the argument that land uses can be relocated and intensified in ways that put households and businesses closer to things they want, with the result that they travel less (at least, less by car) to enjoy the same goods, services, and activities. A problem with that argument is that it grossly simplifies the complex calculus of location decisions and the tradeoffs that households and businesses make. It implicitly presumes that one trip type is equivalent to any other, so it is desirable to reduce the cost of emissions and other external effects by substituting cleaner and shorter trips by alternative modes for longer trips by automobile.[27]

Moreover, mobility has feedbacks on accessibility: the two are different, but not independent. One might initially get more access with more density, but that density will increase congestion, which will then reduce some of that access by reducing mobility. To make sense in concept, access must have embedded in it some notion of travel time (e.g., number of stores or jobs within a 20-minute travel time), which means it is partially a function of mobility.

In this context, proponents of VMT reductions argue that access can increase even as VMT per capita drops because (1) changes in the mix and density of land uses puts desired locations close together, shortening trips, and (2) shorter trips and investments in facilities for alternative travel modes (transit, bike, walk) reduce the percentage of vehicle trips: both the number and distance of trips drops, as does VMT per capita. They also argue that in the U.S. there is a long history of investment and subsidies for facilities directed to the automobile and mobility, and that it is time for more investment in alternative modes, better land use (diversity, density, design), and accessibility.

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[26] Though it could also be measured by the number of trips or amount of travel time.

[27] The length of this paper does not allow exploring the problems of this view. It treats travel as a cost minimization problem, rather than as a net-benefit maximization problem, or as a multi-criterion optimization problem. By analogy, we could all reduce our expenditures on food to meet our daily need for calories by eating simple grains and legumes, but many of us see other gastronomic and social benefits that exceed the extra costs of a more varied diet. In the transportation literature, this is the problem with “least-cost planning” versus “benefit-cost analysis.”

Moving the dial on mobility (VMT)

A basic tenet of the physical and social sciences is that achieving desired outcomes usually requires an understanding of cause and effect. Earlier, this paper listed some of the causes of congestion, and made the case that its intractability resulted from the ways people pay for transportation services (which typically do not include any payment for several of the important external costs of congestion).

VMT has similar causes. Increases in population, economic activity, labor force participation rates, economic productivity, and real per capita incomes (which will increase car ownership) will encourage growth of VMT.[28] Those relationships are a reminder of one of the difficulties for efforts to reduce VMT: VMT is partially caused by and highly correlated with factors that are likely to continue to grow, so public policy will have trouble reducing VMT if such reductions are deemed a desirable outcome.

A simple analysis suggests that any policies that reduce the cost of suburban expansion will probably increase VMT. But some analysts suggest that a pattern of suburban and rural centers could make more efficient use of existing infrastructure and, if not reduce VMT, redistribute it to reduce congestion. Market forces (fuel costs) or policies (congestion pricing, pollution taxes, investments in more and better facilities for alternative modes of travel) that increase the cost of driving relative to travel by other modes will discourage growth of VMT. Market forces (changing demographics and consumer preferences) or policies (impact fees) that decrease the cost of dense development relative to dispersed development will discourage growth of VMT.

Another causal chain links VMT to GHG emissions, which have recently been a main justification for policies to reduce VMT. This paper previously noted the presumed connection: fewer miles, less fuel, less emissions. But the reality is more complicated. Setting aside the fact that technology (of fuel chemistry, combustion, and vehicle weight and aerodynamics) has a big effect on the type and amount of emissions, there is more to driving's contribution to emissions than miles driven: *how* those miles are driven matters. One mile at a constant 55 mph generates less pollution than a much shorter trip in stop-and-go congestion.

To dial back on VMT one can either regulate it directly, or use incentives or regulation to reduce some of the factors that cause it to grow. The term "VMT targets" leads some people to presume that the targets would be achieved by

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[28] Here and throughout the rest of this paragraph, the phrase "other things being equal" is implied.

direct regulation of VMT. How? Some have suggested odd-even driving days based on license-plate numbers. Odometers might be monitored—annual inspections seem cumbersome, but maybe some type of smart card could be inserted into a dashboard reader, and then either prohibit more miles after some limit or charge heavy fees.

Those are the kinds of examples used by opponents of VMT targets because they illustrate the difficulties of any policy that says, effectively, "here is your ration of miles." But most advocates of VMT targets and recent legislation on the topic (e.g., in California and Washington state) do not specify direct rations or restrictions. Rather, they presume that we will try to achieve the targets indirectly, by affecting the factors that contribute to or are simply correlated with VMT. Thus, the preferred policies aim at land use (more diversity and density), investment in alternative modes of transportation, and demand management (including pricing of parking and congestion). Another indirect policy to reduce VMT would be to not expand highway infrastructure (that kind of policy illustrates the dilemma of tradeoffs—it is in direct contradiction to some policies that would do the opposite to *relieve* congestion). It is not a stretch to conclude that if we turn dials like these far enough, the growth or even the amount of VMT might drop. The debate is about whether the benefits of doing so are worth the costs—in other words, about the economics.

Getting the economics right

Getting some idea of the direction and magnitude of the effects of policies to reduce congestion and VMT requires consideration of the basic economics of travel demand. Just a few examples for consideration:

- Think about *net benefits*, not *cost minimization*; think about *tradeoffs*. We cannot simultaneously have the maximum of all the benefits we care about: there are tradeoffs. Minimizing on cost (e.g., minimizing VMT) is the wrong way to think about the problem. Even if it were logical or possible, it would not be efficient, though some reduction in the amount or rate of growth might be.
- Congestion and VMT are linked. Correct pricing of congested urban travel will *probably* reduce VMT in a majority of instances, but it may not.[29] Either way, once pricing is in place, it would be relatively easy to turn the dial on

[29] It depends on how the pricing is implemented. If only a few facilities are priced, rather than the larger system, it is possible that trip diversion to unpriced routes could increase VMT.

prices to get the desired level of VMT, presuming that a specific target can be shown to be efficient.

- The specifics of the policies matter. For example, because congestion and VMT are linked to each other and to GHG, one might reasonably argue that reducing congestion would reduce GHG. If congestion is reduced by congestion pricing, that might be true. If, however, congestion is reduced by building more highway capacity, the emissions reductions from efficient operating speeds could be offset, in part or in total, by those from increased VMT.
- Think carefully about arguments related to the negative impacts of transportation policy on businesses and economic activity. For example:
  - If travel during congested periods is under-priced and pricing congestion improves the efficiency of the transportation system (as most transportation planners and economists now believe), how can better efficiency be *bad* for the economy?
  - Businesses know their business, and they respond to prices. They have economic incentives to resist changes to the transportation system that will increase their travel times (presumably to achieve other important social benefits) because they do not want to incur the costs of changing their production functions. But changes can be forced upon them by public-sector actions or market factors. They have responded before: for example, increased trucking was a response to higher labor and land costs, a change that only became possible when the highway system became fast and reliable (public-sector action), and computers made the logistics possible (market forces). Given the high value of trucks, their inventory, their drivers' time, and cost of delay, freight may be served well by congestion pricing, whose costs will be small relative to the value of the time savings. But if prices increase too much, businesses will re-evaluate their use of trucks as rolling warehouses and may find it preferable to increase inventory cost a little to reduce the downside variability of transport costs.
- Fuel is a small part of the total cost of transportation: that is part of the reason that the amount of driving responds so much less than many people think it should to the price of fuel. The recent report of the Texas Transportation Institute made a similar point, noting why higher fuel prices and an economic slowdown are unlikely to "solve" the congestion problem.[30]

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[30] See footnote 9 above.

- A recent report from the National Academies[31] concluded that "the literature suggests that doubling residential density across a metropolitan area might lower household VMT by about 5 to 12 percent, and perhaps by as much as 25 percent, if coupled with higher employment concentrations, significant public transit improvements, mixed uses, and other supportive demand management measures." In other words, achieving a 10% reduction in total VMT from changes in land use density alone would require that the density of all existing development double, and that new development occur at that new average density. The authors evaluated several development scenarios and estimated the effect on GHG emissions generated by urban households to be in the range of a 1% reduction when the moderate-density scenario (25% of new development is "compact," with 12% less VMT in compact development) was compared to the base case in the year 2050 (reductions prior to 2050 are lower because changes in land use densities take many decades to take effect).

Directions for policies that could reduce congestion and VMT

There is an extensive literature around congestion, its causes, and policies to address it. There is always a risk in generalizing, but the generalization is:

- Urban congestion has grown substantially. It can be temporarily reduced by building new capacity, but that new capacity has become increasingly expensive and decreasingly effective in reducing congestion: in metropolitan areas a ubiquitous network of highways and arterials means that most of the important roads have been built and that additions to capacity in a built urban area are more expensive.
- Congestion is better addressed through demand management (incentives or regulations that influence how and how much people drive; for example, the pricing of parking). The most effective of the demand-management tools is pricing, and the most effective of the pricing tools is congestion pricing.
- The technical challenges of congestion pricing are surmountable: it is operating effectively in several places around the world. The challenge is public acceptance and political will, which are correlated.[32]

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[31] *Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO2 Emissions -- Special Report 298*, 2009. http://www.nap.edu/catalog.php?record_id=12747

[32] Many planners believe that the pattern and density of urban land use must change in a substantial and perhaps improbable way (see footnote 31) to achieve goals for GHG reductions and other aspects of quality of life: some are applauded as visionary. Transportation economists propose a relatively cheap solution almost guaranteed to improve efficiency, raise revenue, and provide much better information about how and where to spend our limited resources, yet the common response is "that is unrealistic."

- Properly implemented, congestion pricing has the advantages of (1) reducing inefficient trips (the ones not valuable enough for a driver to make if he or she has to pay their full costs), (2) generating revenue to improve the highway or transit system and to address concerns about the effects of pricing on classes deemed to merit special treatment, and (3) showing where people think travel is valuable (i.e., where they show that they are willing to pay tolls) and, thus, where we should spend our limited resources for building new capacity.

Congesting pricing is still rare in the U.S., though we are approaching it faster than most observers 15 years ago thought we would. But for now, when addressing congestion and VMT, policy-makers are more likely to look first to a combination of land use policies, investments in alternative modes, and some partial pricing policies (e.g., new or increased parking fees).

Regarding VMT policy, among the first questions a state or regional agency should ask is how VMT targets will be used. Consider air pollution. An adopted target might be specified in terms of number of days when some measurable standard (in parts per million) of a pollutant is not exceeded. A regulating agency might then enforce some point-source standards (e.g., on polluting businesses) that it estimates will provide a reasonable probability of reaching the overall standard. But what would be the equivalent point-source standard for VMT, and how would it be monitored and enforced? If there is a good answer to that question, it is not one that is commonly discussed in the professional literature.

Thus, in a society so long accustomed to freedom of travel, policy is not likely to try to aim at VMT targets with direct restrictions on VMT. Rather it will use incentives and restrictions on things that are presumed, respectively, to reduce or to contribute to VMT: for example, land development patterns, transportation systems (highways and alternative modes), and transportation prices. In that sense, adopting targets to reduce VMT may be, most importantly, a statement of an overall policy direction, and secondarily a metric of progress (among many).[33]

How a VMT target gets defined will have a big effect on how likely it is to be hit. If standard forecasts of population and employment growth in the U.S. are approximately correct, it will be difficult to keep *total* VMT from growing. A recent MDOT report[34] expects that between 2006 and 2030 total VMT will grow at 1.7

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[33] Another possibility is that the targets could indirectly have a big effect because they would provide a legal basis for lawsuits to force changes to other policies presumed to move closer to meeting the targets.

[34] *State Plan on Congestion, (Joint Chairmen's Report, Page 77)*, December 2008

percent per year while population will grow at half that rate. It notes several types of travel demand management the State is pursuing, and says "Consideration is being given to measures that could potentially reduce future VMT growth to 1.0-1.4 percent per year." In other words, it expects to be able to reduce the rate of growth of VMT, total VMT will still grow.

Holding constant or reducing *per capita* VMT is an easier target, even without policy changes: most people with a driver's license have access to a vehicle,[35] real fuel prices are more likely to rise than fall, the drivers in the bulge of baby-boomers are reaching an age when driving many or any miles will be less possible, and market forces and policy may cause a reduction in the long-run trend toward suburbanization and lower-density development.

There are few results in to help evaluate the recent national and state proposals calling for reduction in VMT (or, more accurately in some cases, for the reduction in the growth rate of VMT, or the reduction in VMT per capita). But at least one state tried setting targets for VMT over 15 years ago, and its experience illustrates some of the implementation problems noted above.

Oregon adopted a statewide Transportation Planning Rule in 1991 that, among other things, required that metropolitan areas (MPOs) plan for a 10% reduction in per capita vehicle miles traveled over the 20-year planning period, and a 20% reduction over 30 years. The State's review of the policy in 1998 found MPOs were having trouble meeting the targets, lowered the requirement to a 5% reduction, and authorized metropolitan areas to propose alternative performance measures. Instead of trying to measure VMT and achieve the targets, MPOs were required to do things presumed to move in the direction of reducing VMT per capita including the adoption of regional transportation system plans; benchmarks; an "integrated land use and transportation plan" that would include changes to land use designations, densities and design standards; significant new transportation demand management measures; significant expansion in transit service; and policies to manage major roadway improvements. In other words, concerns about VMT were redirected to address factors believed to be cause and effects of VMT, rather than to address VMT directly.[36]

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[35] In 2001, there were 1.75 drivers and 1.90 vehicles per household. http://www.bts.gov/publications/highlights_of_the_2001_national_household_travel_survey/html/table_a02.html

[36] The actual change of VMT per capita in the Portland metropolitan region between 1991 and 2007 was not the required decrease of about 8%, but an increase on the order of 3% to 4%. http://www.oregonmetro.gov/index.cfm/go/by.web/id=16340

5 CONCLUDING COMMENTS

There is more agreement that congestion should be reduced than that VMT should be reduced. Some people strongly concerned about VMT would be willing to use increasing congestion as a tool for reducing VMT, but most people want to reduce congestion either by building more capacity (highways, or for other modes) or by demand management. Though congestion pricing is likely to be the most effective, fundable, and (if properly implemented) fair way to address congestion, it will probably be preceded by other demand management techniques, targeted expansion of highways where strong congestion or willingness to pay suggests that user benefits will exceed construction costs, investments in alternative modes of transportation, and various land use policies. All of those policies can help with urban congestion provided they are recognized as second-best and temporary solutions to what is fundamentally a pricing problem, and do not delay the hard work of getting pricing solutions ready for implementation.

In a country where people are accustomed to freedom of travel and where the number of highway vehicles is approaching the number of people, direct restrictions on VMT will be technically and politically difficult. Moreover, there are thoughtful, informed, and committed people on both sides of the argument about whether the reduction of VMT, per se, is a good objective for public policy. Adopting targets for the reduction of the growth or amount of total or per capita VMT would be a signal of the increasing political importance of addressing problems that are caused by or simply correlated with VMT. But progress toward the targets—and more importantly, toward changes in the negative effects correlated with VMT (e.g., GHG emissions, depletion of scarce fuel resources, dispersed land-use patterns)—will best be made by policies aimed at reducing those negative effects by means other than direct regulation of VMT (e.g., technological advances, pollution taxes, fuel taxes, land-use policies).[37]

[37]The Council of Ministers of the European Conference of Ministers Of Transport reported in *Review of CO2 Abatement Policies for the Transport Sector, Conclusions and Recommendations* (2006) that (1) Carbon and fuel taxes are the ideal measures for addressing CO2 emissions., (2) the largest abatement opportunities in the transport sector lie in initiatives to improve energy efficiency, and (3) most modal shift policies achieve much lower abatement levels, but (4) policies to improve the urban environment for non-motorized trips have often been neglected.