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Are Vehicle Travel Reduction Targets Justified?

Evaluating Mobility Management Policy Objectives Such As Targets To Reduce VMT And Increase Use Of Alternative Modes

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Bus priority can reduce total vehicle travel in ways that benefit everybody, including transit users who enjoy better service and motorists who experience less congestion, crash risk and pollution.

Abstract

This report investigates whether transportation policies should include *mobility management objectives*, such as targets to reduce vehicle travel and encourage use of alternative modes. Such objectives are justified on several grounds. Mobility management objectives provide guidance to help individual short-term decisions support strategic, long-term goals. Mobility management can provide numerous benefits. Many mobility management strategies are market and planning reforms that increase transport system efficiency and equity. Mobility management objectives help shift planning practices to better prepare for future demands. Mobility management criticism tends to reflect an older, automobile-oriented transportation planning paradigm which considers a limited range of objectives, impacts and options. More comprehensive analysis tends to favor mobility management. Appropriate mobility management can reduce vehicle travel in ways that minimize costs and maximize benefits to consumers and society.

Introduction

Should transportation policies include *mobility management objectives*,[1] such as targets to reduce vehicle miles of travel (VMT) and encourage use of alternative modes (walking, cycling, public transit, etc.)? The recently introduced *Federal Surface Transportation Policy and Planning Act of 2009* includes goals to "reduce national per capita motor vehicle miles traveled on an annual basis" and "increase the total usage of public transportation, intercity passenger rail services, and non-motorized transportation on an annual basis" (Commerce Committee 2009). A proposed federal law would establish goals to reduce per capita vehicle miles traveled by 16%; triple walking, biking, and public transportation usage; and increase the proportion of freight transport provided by railroad and intermodal services by 20% (Holt, et al. 2009). California law now requires regional governments to develop *smart growth* transport and land use plans that reduce VMT (CPDR 2008). The Washington State legislature set a goal to reduce statewide per capita VMT 25% below 1990 levels by 2035 (Winkelman, Bishins and Kooshian 2009).

VMT reduction targets force a shift from automobile-dependent to multi-modal transport planning. There are several specific reasons to establish such targets:

- They provide strategic guidance for individual policy and planning decisions.
- Mobility management can help solve numerous problems and provide numerous benefits. It tends to be particularly effective at reducing urban-peak travel, which provides large savings and benefits.
- VMT reduction policies help create a more diverse and efficient transportation system that better responds to future travel demands.
- They encourage policy makers to correct existing practices that stimulate VMT growth (such as unpriced roads, generous and free vehicle parking, and dedicated roadway funding that cannot be used for alternative modes), and implement mobility management. Many mobility management strategies reflect market principles and so help create a more efficient and equitable transportation system.

Highway advocacy groups such as the Highway Users Alliance (HUA 2009) and the Reason Foundation (Poole 2009a), and some transport policy experts (Pisarski 2009a), oppose these objectives, claiming that VMT reductions and smart growth harm consumers and the economy, are cost inefficient and unfair. Poole (2009b) calls VMT reduction goals "A Terrible Idea" and challenges proponents to prove they are cost effective. I accept that challenge.

This report investigates these issues. It discusses the justifications for establishing mobility management objectives and evaluates criticisms of these policies. It discusses how mobility management objectives can help create a transportation system that better responds to future needs.

[1] *Goals* are ultimate desired outcomes, such as health, wealth and happiness. *Objectives* are specific policies or actions that help achieve goals. *Mobility management objectives* are therefore specific actions that affect the amount and type of mobility that occurs in an area.

Mobility Management Defined

Mobility management (also called *transportation demand management* [TDM], v*ehicle miles of travel* [VMT] *reductions*, and *mode shifting*) refers to policies and programs that change travel activity to achieve planning objectives and increase transport system efficiency (VTPI 2008). Table 2 lists common mobility management strategies.

Table 2 **Mobility Management Strategies** (VTPI 2008)

Improved Options	Incentives	Land Use Policies	Programs
Transit improvements Walking and cycling improvements Rideshare programs Flextime Telework Carsharing	Congestion pricing Distance-based fees Parking cash out Parking pricing Pay-as-you-drive vehicle insurance Fuel tax increases	Smart growth New urbanism Parking management Transit oriented development Car-free planning Traffic calming	Commute trip reduction programs School and campus transport management Freight transport management TDM marketing

This table lists various mobility management strategies.

Mobility management is more than individual solutions to individual problems, such as road pricing to reduce traffic congestion or transit improvements to reduce pollution emissions, it should be implemented as an integrated program based on principles of economic efficiency and good planning. It is supported by professional organizations such as the Institute of Transportation Engineers (www.ite.org/planning/tdm.asp) and the Federal Highway Administration (http://ops.fhwa.dot.gov/tdm). Even roadway expansion advocates often support specific mobility management strategies such as efficient road and parking pricing (Staley and Moore 2008).

Mobility management reflects a paradigm shift (Litman and Burwell 2006). The old planning paradigm assumed that *transportation* means automobile travel; that any increase in mobility is beneficial and any constraint on mobility are harmful; and transport agencies' only responsibility is to expand facilities to accommodate additional vehicle traffic. The new paradigm assumes the goal of transportation is *accessibility* (people's ability to reach desired goods, services and activities); there is an optimal level of vehicle travel beyond which additional mobility is overall harmful to consumers and society; and that transportation agencies have many responsibilities and solutions.

Table 2 **Transport Planning Paradigm Shift**

Factor	Old Paradigm	New Paradigm
Definition of transportation	Vehicle travel – mobility	Accessibility (peoples' ability to reach desired goods, services and activities)
Modes considered	Automobile and truck	All modes
Land use development	Low-density, automobile-dependent	Compact, mixed, multi-modal
Performance indicators	Vehicle traffic speeds, roadway Level-of-Service	Multi-modal Level-of-Service, overall accessibility
Favored improvements	Expanded road and parking capacity, increased traffic speeds	Multi-modal improvements, mobility management,

A paradigm shift is changing the way transportation problems are defined and solutions evaluated.

Mobility Management Justifications

The following sections discuss specific justifications for mobility management and therefore for vehicle travel reduction policy objectives.

Provides Strategic Guidance for Individual Policy and Planning Decisions

The most fundamental principle of good planning is that individual, short-term decisions should be consistent with strategic, long-term goals. Current transportation policies often fail to reflect this principle: individual planning decisions often contradict strategic objectives, resulting in inefficiency. Mobility management objectives can help guide the long-term goals of individual policy and planning decisions. For example, mobility management objectives encourage policy makers to choose efficient pricing and investments, transportation agencies to develop mobility management programs, and transportation professionals to learn about mobility management techniques.

This guidance is not limited to special, mobility management programs, such as commute trip reduction programs. It can apply to all sorts of day-to-day decisions that affect transportation activity. Many transport and land use policies and planning decisions affect the amount and type of travel that occurs in an area, as summarized in Table 3. These impacts are cumulative and can be large in total: people who live or work in automobile-oriented areas typically drive 40-60% more annual miles and rely less on alternative modes than they would in more multi-modal communities (Pratt 1999-2009; Ewing, et al. 2007; VTPI 2008).

Table 3 **Examples of Policy and Planning Decisions That Affect Mobility**

Transport Policies	Land Use Policies
Fuel prices	Location of facilities and activities (jobs, housing, services, etc.)
Road tolls	Land use density and mix
Roadway supply and design	Parking supply and price
Sidewalk and path supply and quality	Building orientation
Public transit service supply and quality	
Mobility management programs	

Many policy and planning decisions affect the amount and type of mobility that occurs in an area.

These impacts are often overlooked. Many transport and land use policy decisions are based on narrow, short-term considerations, and contradict strategic, long-term goals. For example, transportation agencies often expand roadways to reduce traffic congestion, although this induces additional vehicle travel which increases downstream traffic and parking congestion, accidents, energy consumption and pollution emissions, although other congestion reduction strategies are available. Similarly, most local governments have generous minimum parking requirements to improve parking convenience, although this induces additional vehicle traffic and sprawl, which increases traffic congestion, accidents, energy consumption and pollution emissions.

Helps Solve Numerous Problems and Provide Numerous Benefits

Most mobility management strategies can help solve numerous problems and provide numerous benefits, including congestion reduction, road and parking cost savings, consumer savings, traffic safety, improved mobility for non-drivers, energy conservation, emission reductions, efficient land development, and improved public fitness and health. Although not every mobility management strategy achieves all of these benefits, most help achieve several. Some strategies are particularly beneficial because they reduce especially costly vehicle travel. For example, public transit improvements, efficient road and parking pricing, and commute trip reduction programs tend to reduce urban-peak vehicle travel, which has high congestion, parking, consumer and pollution costs.

Most mobility management strategies only affect a small portion of total travel and so individually are seldom considered the best solution to a particular problem. However, their impacts are cumulative and synergistic (total impacts are larger than the sum of individual impacts) so integrated mobility management programs can provide large benefits and are often quite cost effective, considering all benefits and costs (VTPI 2008). For example, public transit improvements may only reduce traffic 5-15%, and so would not be considered the best way to reduce congestion, accidents, energy consumption or pollution problems individually, but transit improvements implemented with efficient road and parking pricing, commute trip reduction programs, and supportive land use policies can provide much larger impacts and benefits.

Integrated mobility management packages tend to be particularly beneficial compared with other solutions to transport problems. For example, although roadway expansion may reduce traffic congestion, it tends to induce additional vehicle travel which exacerbates parking problems, accidents, energy consumption, pollution emissions and sprawl. Similarly, increasing vehicle fuel efficiency conserves energy but by reducing vehicle operating costs tends to increase total vehicle travel which exacerbates traffic and parking congestion, accidents, and sprawl. Mobility management strategies help achieve many objectives, as illustrated in Table 4.

Table 4 **Comparing Strategies** (VTPI 2008)

Planning Objective	Roadway Expansion	Fuel Efficient Vehicles	Mobility Management and Smart Growth
Congestion Reduction	✓	×	✓
Parking Cost Savings	×	×	✓
Facility Costs Savings	×	×	✓
Consumer Costs Savings	×		✓
Reduced Traffic Accidents	×	×	✓
Improved Mobility Options	×		✓
Energy Conservation	×	✓	✓
Pollution Reduction	×	✓	✓
Land Use Objectives	×	×	✓
Physical Fitness & Health	×		✓

Some transport improvement strategies help achieve one or two objectives (✓), but by increasing total vehicle travel contradict others (×). Win-Win strategies reduce total motor vehicle travel, and so support many planning objectives, providing multiple economic, social and environmental benefits.

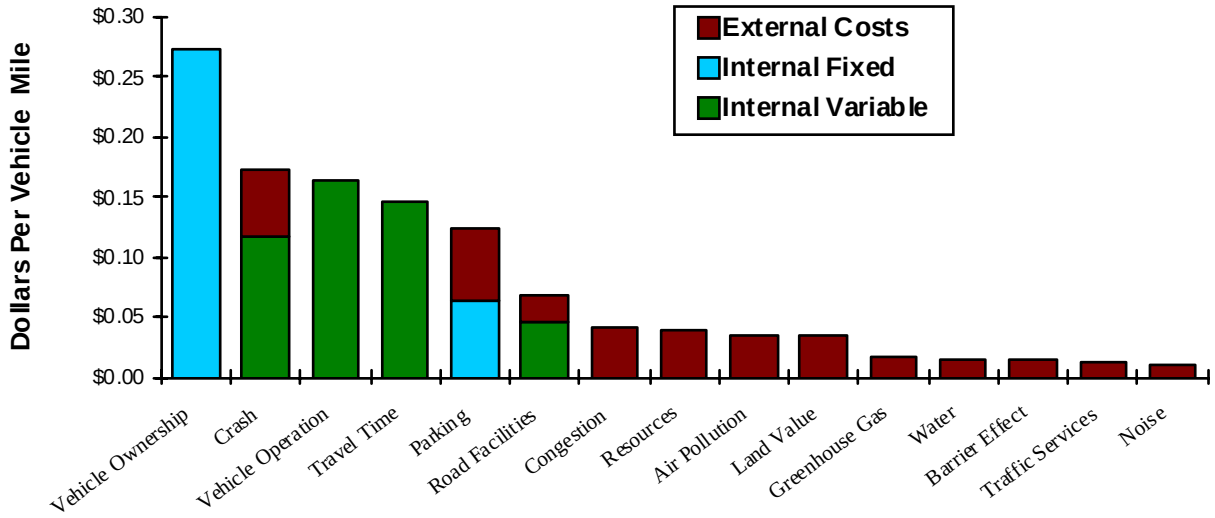
Table 5 **Automobile Transportation Cost Estimates** (Litman 2009)

Cost Category	Estimates	Monetization Methods
Vehicle Ownership	0.272	Published estimates of vehicle ownership costs (depreciation, insurance, etc.).
Crashes	0.173	Estimates of the full costs of traffic crash damages and injuries.
Vehicle Operation	0.164	Published estimates of vehicle operating costs (fuel, oil, tire wear, etc.).
Travel Time	0.146	Published estimates of the value people place on their travel time.
Parking	0.124	Estimates of total parking costs to consumers, businesses and governments.
Road Facilities	0.069	Transportation agency expenditures on road construction and maintenance.
Congestion	0.042	Published estimates of congestion traffic congestion costs.
Resources	0.039	Estimated external economic costs of consuming resources such as gasoline.
Air Pollution	0.035	Published estimates of local air pollution costs.
Land Value	0.034	Published estimates of the value of land used for roadways.
Greenhouse Gas	0.017	Published estimates of climate change emission costs.
Water Pollution	0.014	Estimated water pollution and hydrologic cost of vehicle use and roadways.
Barrier Effect	0.014	Estimated delay cost to pedestrians and cyclists caused by vehicle traffic.
Traffic Services	0.012	Government expenditures on traffic planning, policing and emergency services.
Noise	0.011	Published estimates of noise pollution costs.

This table indicates the estimated value of various vehicle costs and therefore VMT reductions benefits.

These benefits can be quantified. Table 5 and Figure 1 indicate estimated average *monetized* (measured in monetary units) costs of automobile transportation, and therefore the value of vehicle travel reduction benefits. For example, a mobility management strategy that reduces a million VMT is estimated to provide $173,000 worth of crash cost savings, $42,000 worth of congestion reductions, and $35,000 worth of air pollution reductions. Such benefits are greater if VMT reductions consist primarily of urban-peak travel, which has higher than average costs. This illustrates the importance of comprehensive analysis. For example, a strategy that reduces congestion by 20% is worth much less if it also increases vehicle costs, crashes or parking costs by 10%, because those costs are relatively large in magnitude, but a congestion reduction strategy becomes much more cost effective if it also reduces vehicle, crash or parking costs.

Figure 1 **Costs Ranked by Magnitude** (Litman 2009)



This figure shows Average Car costs per vehicle mile, ranked by magnitude.

Helps Prepare For Future Travel Demands

Several demographic and economic trends reduce demand for automobile travel and increase demand for alternative modes.

Trends Shifting Travel Demands (Litman 2006)

- *Aging population.* As the Baby Boom generation retires per capita vehicle travel will decline and their demand for alternatives will increase.
- *Saturation of vehicle ownership and use.* During most of the last century, per capita vehicle ownership and use rose steadily, but in the last decade they have reached saturation levels, so no further growth is expected.
- *Rising fuel prices.* This will increase demand for energy efficient travel options such as walking, cycling and public transit, and more accessible land use development.
- *Increasing urbanization.* As more people move into cities the demand for urban modes (walking, cycling and public transportation) increases.
- *Increasing traffic congestion and roadway construction costs.* This increases the relative value of alternative modes that reduce urban traffic congestion.
- *Shifting consumer preferences.* Various indicators suggest that an increasing portion of consumers prefer multi-modal urban neighbourhoods and alternative modes.
- *Increasing health and environmental concerns.* Many individuals, organizations and jurisdictions plan to reduce pollution and increase physical fitness.

As a result of these trends, per capita annual automobile travel has peaked in most wealthy countries, and demand for alternatives is growing.[2] This is not to suggest that automobile travel will disappear, but per capita vehicle travel is likely to decline somewhat in future, and demand for alternative modes is likely to increase. It is sensible for transportation policies to reflect these changes, which means creating more diverse and efficient transportation systems, and more accessible, multi-modal communities. Mobility management objectives are a practical way to help implement these changes.

[2] In public lectures I often ask the audience, "Compared with your current travel patterns, how many of you would prefer to drive more than you currently do, and how many would prefer to drive less, provided that alternative modes are convenient, comfortable and affordable?" In virtually every case most audience members indicate that they would prefer to drive less and few want to drive more than they currently do.

Corrects Existing Policies that Resulted in Economically Excessive Vehicle Travel

According to economic theory, an efficient transport system must reflect these principles:

- *Consumer options.* Consumers have a variety of transport and location options so they can choose the combination that best meets their needs and preferences.
- *Efficient pricing*. The prices that consumers pay for a good reflect the full marginal costs of supplying that good, unless a subsidy is specifically justified.
- *Economic neutrality*. Public policies and planning practices are not arbitrarily biased in favor of one good over others.

Current transportation policies are distorted in various ways that tend to increase motor vehicle travel beyond what is economically optimal, as summarized in Table 6.

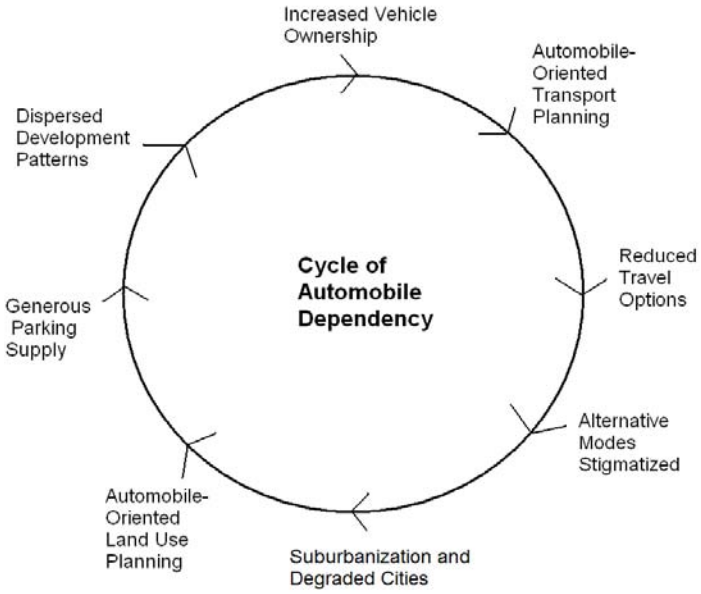
Table 6 **Summary of Transportation Market Distortions**

	Description	Examples	Potential Reforms
Consumer options and information	Markets often offer limited alternatives to automobile transportation and automobile-oriented location.	Poor walking and cycling conditions. Inadequate public transit service. Lack of housing in accessible, multi-modal locations.	Improve alternative modes such as walking, cycling, public transit and carsharing. Integrate alternative modes. Make more affordable housing available in accessible areas.
Efficient Pricing	Many motor vehicle costs are fixed or external.	Unpriced roads. Unpriced parking. Fixed insurance and registration fees. Low fuel prices.	As much as feasible, charge marginal prices for roads, parking and emissions, and convert fixed costs, such as insurance and registration fees, into variable costs.
Transport Planning Practices	Transportation planning and investment practices favor automobile-oriented improvements, even when other solutions are more cost effective.	Dedicated roadway funds. Transportation system performance indicators based on vehicle traffic conditions. "Reductionist" planning, which ignores many objectives and options.	Apply least-cost planning. Fund alternative modes and mobility management whenever cost effective. Apply multi-modal transport performance indicators.
Land Use Polices	Current land use planning policies encourage lower-density, automobile-oriented development.	Generous minimum parking requirements. Restrictions on land use density and mix. Development and utility fees that fail to reflect the higher costs of dispersed locations.	Smart growth policy reforms that support more accessible, multi-modal land use development. Location-based development and utility fees.

This table summarizes various transportation market distortions and potential reforms.

For most of the last century, transportation and land use policies and planning practices tended to favored automobile travel. Transportation agencies used "predict and provide" planning: they expanded roads and required more parking in anticipation of traffic growth, and invested relatively little in other modes. This resulted in communities where driving is convenient but other modes are inconvenient and uncomfortable, creating a self-reinforcing cycle of increased automobile dependency and sprawl (Figure 2). Mobility management objectives can lead to more balanced and efficient transport systems.

Figure 2 **Cycle of Automobile Dependency and Sprawl**



This figure illustrates the self-reinforcing cycle of increased automobile dependency and sprawl. Establishing objectives to reduce vehicle travel and increase use of alternative modes can help correct existing market distortions that lead to inadequate transport options, economically excessive automobile travel, and sprawled land use patterns.

These planning practices reflect an assumption that any increase in vehicle travel is desirable. For example, transportation system performance is evaluated based on vehicle travel speeds and roadway level-of-service ratings, most parking standards impose generous minimum requirements and public policies strive to minimize road, parking and fuel prices so driving is cheap. But like any good, too much mobility can be as harmful as too little.

As an analogy, food is essential for life, and eating is an enjoyable and sociable activity. However, this does not mean that more eating is necessarily better, that current diets are optimal, or that society should subsidize all food. At the margin (relative to current consumption) many people would benefit from eating less. Food subsidies may be justified for undernourished people, but since over-eating can be as unhealthy as under-eating it is both economically and medically harmful to subsidize all food for everybody or in other ways encourage people to increase eating.

Similarly, that mobility provides benefits does not mean that *more* vehicle travel is necessarily better, that current levels of mobility are optimal, or that motor vehicle use should be subsidized. Transportation policies should strive to achieve the *optimal* level of mobility that maximizes benefits to users and society.

In a more efficient transportation system, with better mobility options, more efficient pricing, and more neutral public policies, consumers would drive less, rely more on alternative modes, and be better off overall as a result (Litman 2008). For example, improving walking and cycling conditions, and better public transit services typically reduces automobile travel 10-20%; efficient pricing (charging users directly for road and parking costs, distance-based insurance and registration fees, and emission fees) typically reduces automobile travel 20-40%; and more accessible and multi-modal land use policies typically reduce automobile travel 5-15% (Pratt 1999-2009; VTPI 2008).

Mobility management critics might argue that VMT reductions should be an outcome of market reforms rather than planning objectives. "Let's just implement efficient pricing and let consumers decide whether or not to reduce their mobility," they could suggest. But planning often involves tradeoffs between mutually-exclusive options. For example, money spent on roads and parking facilities is unavailable to invest in alternative modes, expanding roadways to increase traffic volumes and speeds degrades walking and cycling conditions, and generous minimum parking requirements stimulate more driving and lower-density development patterns.

Mobility management consists of practical methods to achieve more optimal transportation patterns. To the degree that current automobile travel is excessive and inefficient, mobility management is the solution. Mobility management strategies correct specific market distortions that result in excessive automobile ownership and use, and help reduce specific problems such as traffic congestion, high consumer costs, accidents, energy dependency and pollution emissions.

Mobility management objectives encourage policy makers and planners to correct current practices that stimulate VMT growth (such as unpriced roads, generous and free vehicle parking, and dedicated roadway funding that cannot be used for alternative modes) and to favor alternative practices that will result in a more diverse and efficient transportation system. For example, they encourage state and regional transportation agencies to invest more in walking, cycling, ridesharing and public transit, and to consider implementing pricing reforms and mobility management strategies as an alternative to expanding roadways. Similarly, they encourage local governments to reform parking policies and implement more efficient parking management. Mobility management objectives encourage transportation agencies to choose the congestion reduction strategies that also help conserve energy, reduce pollution and improve mobility for non-drivers, and encourage environmental agencies to choose energy conservation and emission reduction strategies that also help reduce congestion and accidents, and save consumers money.

Mobility management objectives will not really require motorists to "give up their cars altogether" or harm lower-income people, as critics claim (HUA 2009). Properly implemented mobility management can provide significant net benefits, particularly to lower-income people who tend to gain the most from more affordable mobility options, financial rewards for using alternative modes, and more accessible, multi-modal communities. The next section examines these criticisms in more detail.

Evaluating Criticisms

This section evaluates specific criticisms of mobility management objectives.

Harms Consumers

Mobility management critics argue that, since consumers choose to travel by automobile and select automobile-dependent locations, these must be beneficial, and so any policies that reduce vehicle travel or sprawl must be harmful (Pisarski 2009a and 2009b). This is not necessarily true; many mobility management strategies use positive incentives that directly benefit the people who reduce driving by improving travel options or rewarding travel reductions (Table 7). VMT reductions reflect direct user benefits, in addition to external benefits such as reduced traffic congestion, accident risk and pollution emissions.

Table 7 **Mobility Management Strategy Impacts** (VTPI 2008)

Positive Incentives	Negative Incentives	Mixed
Public transit improvements	Road tolls	Smart growth
Walking and cycling improvements	Parking pricing	New urbanism
Rideshare and carshare programs	Fuel tax increases	Parking management
Flextime and telework		Transit oriented development
Pay-As-You-Drive pricing		Car-free planning
Parking cash out and unbundling		Traffic calming

This table categorizes mobility management strategies according to their direct impacts on users.

Even consumers who face negative incentives, such as higher fees or traffic calming, are often better off overall from mobility management. For example, people who reduce their driving due to higher road tolls, parking fees or fuel prices may be better off overall if the revenues are used in ways that benefit them, for example, to improve their travel options or reduce other taxes. Even people who continue to drive may benefit overall if this reduces their congestion or accident risk, or reduces their need to chauffeur non-driving family members and friends.[3]

Although it would be inefficient to reduce vehicle travel arbitrarily, for example, by randomly forbidding vehicle trips, efficient mobility management improves the convenience of higher value automobile trips (by reducing congestion when motorists are willing to pay directly for road and parking use) while giving consumers incentives to reduce low-value automobile travel, such as trips that provide little benefit or that can easily shift to alternative modes or destinations.

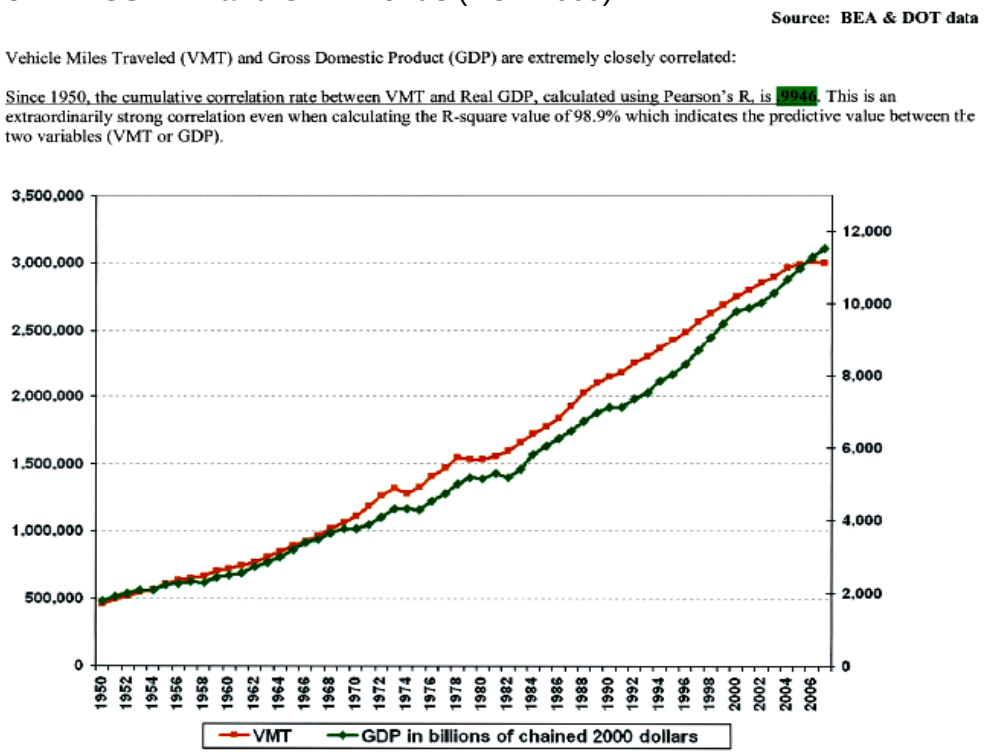
To the degree that mobility management objectives help create a transportation system that better responds to future travel demands, applies positive incentives and efficient pricing, resulting vehicle travel reductions can maximize consumer benefits and minimize consumer costs.

[3] For more information on evaluating mobility changes see *Guide to Calculating Mobility Management Benefits* (Litman 2007b) and *Transportation Cost and Benefit Analysis* (Litman 2009).

Harms the Economy

Mobility management critics argue that reducing vehicle travel is economically harmful. For example, the Highway Users Alliance presents the graph below, which they claim "proves" that because vehicle travel and economic activity (measured as *gross domestic product* or *GDP*) are closely correlated, any reduction in vehicle travel is economically harmful. This proves nothing of the sort. This graph indicates nothing about the direction of the relationship or the feasibility of decoupling mobility and economic activity so that economic productivity can increase without vehicle travel growth.

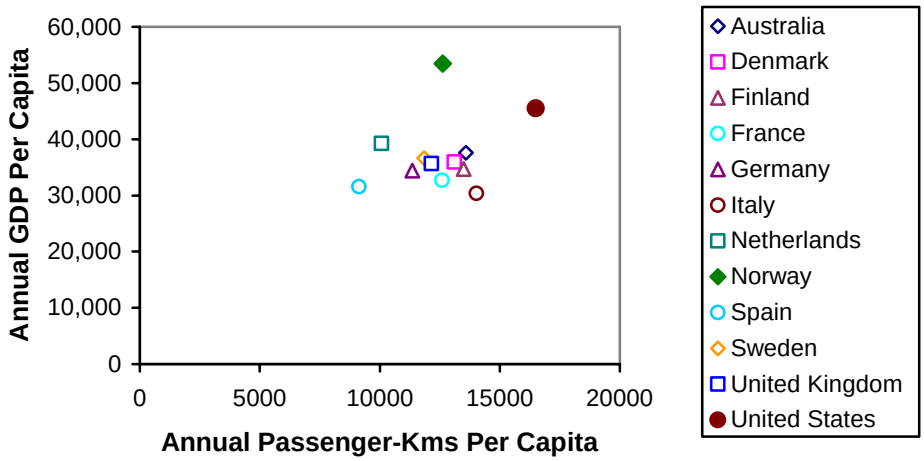
Figure 3 **US VMT and GDP Trends** (HUA 2009)



The Highway Users Alliance claims that this graph proves that a reduction in vehicle travel will reduce economic productivity, but correlation does not prove causation.

The relationship between personal vehicle travel and economic development is weak. Many wealthy countries have much lower levels of automobile travel than what occurs in the U.S., as illustrated in Figure 4. Of particular interest is Norway, which produces petroleum but maintains some of the worlds' highest fuel prices and has other mobility management policies to discourage automobile travel and encourage use of alternative modes. These policies minimized domestic fuel consumption, leaving more oil to export. As a result, Norway has one of the world's highest incomes, a competitive and expanding economy, a positive trade balance, and the world's largest legacy fund.

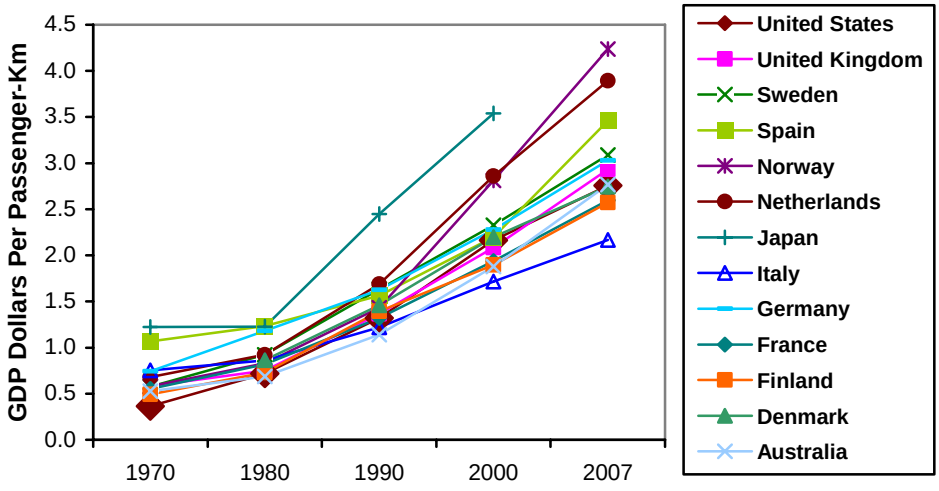
Figure 4 **Per Capita Mobility and GDP** (OECD 2009)



Per capita vehicle travel and wealth vary. Many wealthy countries have significantly less mobility than in the U.S. Norway in particular is an example of a wealthy petroleum producer that emphasizes mobility management. The upper-left quadrant indicates most mobility efficiency (more GDP per passenger-kilometer), the lower right quadrant is least efficient.

Virtually all developed countries are increasing GDP per unit of mobility and some are more successful than the US, as illustrated in Figure 5. This increase in economic efficiency (more economic output per unit of input), provides a competitive advantage. Mobility management is the practical way to achieve this efficiency gain; it allows consumers and businesses to increase economic productivity per unit of travel, reducing total transportation costs to consumers, businesses and governments.

Figure 5 **GDP per Passenger-Kilometer for Various Countries** (OECD 2009)



International data shows that all peer countries are increasing GDP per passenger-mile, some much more quickly than the U.S.

Pollution Reduction Cost Efficiency

Critics argue that mobility management is an inefficient way to reduce pollution emissions (Poole 2009b). This reflects reductionist analysis, in which a single strategy is evaluated for addressing a single problem. More comprehensive analysis indicates that, when all benefits and costs are considered, mobility management is often quite cost effective compared with alternatives (Winkelman, Bishins and Kooshian 2009).

Described differently, a ton of emission reductions provided by mobility management provides many times the total benefits as the same amount of emissions reduced by more efficient and alternative fuel vehicles (e.g. hybrids and electric cars), because VMT reductions achieves other planning objectives, while increased vehicle fuel efficiency makes driving cheaper, which stimulates more vehicle traffic that exacerbates problems such as congestion, parking costs, accidents and sprawl (Litman 2005).

Table 8 indicates the benefit and cost that should be considered when evaluating mobility management cost effectiveness. Critics generally consider only a few of these impacts and so underestimate total mobility management cost effectiveness.

Table 8 **Mobility Management Benefits and Costs**

Benefit Categories	Cost Categories
Direct user benefits (from positive incentives) Revenues (from pricing strategies) Congestion reduction Roadway costs savings Parking cost savings Consumer savings Accident reductions Improved mobility options Energy conservation Pollution reduction Physical fitness and health	Reduced mobility benefits Subsidies User fees Transaction costs (costs to pay and collect fees, and any additional enforcement costs)

This table indicates the categories of benefits and costs that should be considered when evaluating mobility management cost effectiveness.

Some mobility management strategies are particularly cost effective. For example, fuel tax increases, distance-based insurance and registration fees, more efficient parking management, and more compact and mixed development, can have modest incremental costs and substantial economic benefits. Walking, cycling and public transit improvements are often cheaper than accommodating additional automobile travel, considering all costs (roads, parking and vehicle costs). Some strategies are particularly effective at reducing emissions. Fuel tax increases and distance-based pricing can provide significant emission reductions with modest implementation costs (CBO 2003; Parry 2005). Efficient road pricing reduces VMT and congestion, providing extra emission reductions. Aviation transport management reduces high altitude pollution emissions which have particularly severe climate change impacts. Freight transport management can reduce travel by heavy vehicles that have high emission rates per vehicle-mile.

Some studies have evaluated the cost effectiveness of climate change emission reduction strategies, but none includes comprehensive analysis of mobility management benefits and costs. Some ignore mobility management altogether (Gallagher, et al. 2007) or only mention it incidentally (McKinsey 2007). A few studies recognize mobility management as an important way to reduce emissions (Burbank 2008; Yang, et al. 2008; Cambridge Systematics) but fail to quantify the full economic, social and environmental benefits. As a result, most currently available studies undervalue mobility management and smart growth strategies. A recent Center for Clean Air Policy (CCAP) study identified the following examples of cost effective mobility management emission reduction programs (Winkelman, Bishins and Kooshian 2009):

- The Sacramento region's smart growth plan provides net economic benefits estimated at $198 per ton of CO_2 emissions reduced due to infrastructure and consumer fuel savings.
- Transit investments and demand management in Georgia are projected to reduce emissions while providing more than $400 billion net economic benefits over 30 years.
- The Atlantic Station project in Atlanta, Georgia will reduce CO_2 and provide net savings because additional municipal tax revenues exceed the project loan costs.
- A $73 million investment in Portland, Oregon's new downtown streetcar helped attract $2.3 billion in private investment within two blocks of the line, and bicycle infrastructure investments are estimated to provide net economic benefits of more than $1,000 per ton of CO_2 emissions reduced.
- Distance-based vehicle insurance could reduce vehicle travel and related emissions by 8%, provide direct consumer savings averaging $270/vehicle-year and $50-60 billion annual in total societal benefits.

Consumer Sovereignty

Consumer sovereignty means that, as much as possible, consumers should be free to choose the goods that best meet their needs, without bias or coercion, to maximize their welfare. This principle suggests that transportation policies should allow consumers to choose how and how much to travel without external intervention. Critics argue that mobility management and smart growth policies violate this principle, representing a form of *social engineering* that intrudes unnecessarily into consumers' lives. The Highway User Association argues that mobility management attempts to "alter behavior and personal choice" (HUA 2009), and Pisarski (2009a and 2009b) argues that such policies prevents consumers from choosing the lifestyles they prefer.

But modal neutrality is not really possible since transportation systems are created by consumer, business and government decisions. Travelers provide their own shoes, bicycles and vehicles, but rely on facilities and services provided by governments, and by businesses in response to government requirements (sidewalks, paths, roads, parking, ports, airports, public transportation services). Public policy and planning decisions therefore determine transport options are available and there is no way to determine what decision are neutral; the policies that result in current high levels of automobile ownership and use can be considered just as biased and coercive as those proposed to reduce VMT and encourage use of alternative modes.

Many transportation policy and planning decisions are mutually exclusive: money spent on roads is unavailable for sidewalks, paths and transit services, and road space devoted to traffic and parking lanes is unavailable for sidewalks, bike lanes and bus lanes. Similarly, many land use decisions involve trade-offs between automobile-oriented and multi-modal development. Automobile access favors development along major roadways and at highway intersections with abundant parking supply, while multi-modal access favors compact, mixed use, walkable development around transit stations. For example, when choosing where to locate public facilities such as schools or government offices, public officials must decide whether to favor automobile or multi-modal access.

Consumer make short-term decisions to optimize based on available options and incentives. Policy and planning decisions determine the transportation options and incentives available. Good policy and planning therefore requires strategic guidance so future conditions will meet consumer demands.

As discussed earlier, many current policies and planning practices tend to favor automobile travel over other modes. For example, most transportation funding is spent on automobile facilities (government expenditures on roads plus private expenditures on parking facilities), and current roadway design practices maximize automobile traffic speeds and volumes even when this reduces accessibility by other modes. Similarly, public policies minimize the price of driving, with generally unpriced roads and parking, and low fuel prices. High levels of vehicle travel may reflect, in part, a self-fulfilling prophecy. To the degree that current policies favor driving over other modes, mobility management and smart growth policies help provide true modal neutrality by improving alternatives so travelers have viable options. They are not intended to eliminate automobile ownership and use, rather, they are intended to create more balance between modes, allowing consumers to choose the best option for each trip. VMT reduction targets help achieve this balance.

Travel patterns also reflect social norms and consumer inertia. Consumers may continue to use established but undesirable transport patterns simply because they are considered "normal." In such situations, consumers benefit from policies that encourage change.

Harms Poor People

Critics claim that mobility management harms poor people. This might be true if the only strategy is to increase road, parking and fuel prices, but lower-income people can benefit significantly from integrated programs that include improved travel options, particularly affordable modes such as walking, cycling, ridesharing and public transit; positive incentives such as parking unbundling and cash out, distance-based vehicle fees; flextime and telework; and land use policies that create more accessible, multi-modal communities with affordable housing (VTPI 2009). Lower-income people often rely on alternative modes and so tend to benefit significantly from their improvement, and from better transportation and land use integration (such as more affordable housing and employment in areas easily accessed by walking, cycling and public transit).

Conclusions

This is a critical juncture for transportation policy. The last century was the period of automobile transport ascendency, during which it made sense to plan for growing vehicle travel. The next century requires very different policies.

Demographic and economic trends are increasing demand for alternative modes, and economic competitiveness will require a more efficient transportation system. To meet these needs, transportation policies should place less emphasis on system expansion and more emphasis on efficient management of existing resources. To facilitate these changes policy makers should establish objectives to reduce vehicle travel and increased use of alternative modes. These objectives will help coordinate individual planning decisions to create more diverse and efficient transport systems.

Critics argue that mobility management harms consumers and the economy, and is biased and coercive, but the policies that result in current high levels of vehicle ownership and use are as harmful, biased and coercive as policies used to reduce VMT and encourage alternatives. Many mobility management strategies are cost effective, considering all benefits and costs. Criticisms reflect an older planning paradigm which assumes that *transportation* means driving, mobility is an end in itself, and transportation agencies have limited responsibilities and solutions. Critics tend to apply incomplete analysis that exaggerates mobility management costs and ignores many benefits.

A new planning paradigm considers mobility a means to achieve access, recognizes that excessive mobility harms consumers and society, and expects transportation agencies to consider a wide range of objectives, impacts and options. The new paradigm applies *systems analysis* rather than focusing on individual components and solutions. For example, it favors congestion reduction strategies that also help reduce parking and pollution problems, and improve mobility for non-drivers; and emission reduction strategies that also help reduce traffic congestion and crashes, and save consumers money.

Appropriate mobility management strategies reduce vehicle travel in ways that benefits consumers and supports economic development. These reflect principles of economic efficiency and good planning. Many VMT reduction critics actually support certain mobility management strategies, such as efficient road and parking pricing, more flexible zoning codes, and ridesharing incentives. In a more diverse and efficient transportation system, consumers will choose to drive less, rely more on alternative modes, and be better off overall as a result. Automobile travel will not disappear, but it will decrease compared with what would occur with current planning practices.

Mobility management policies help create a transportation system that meets future needs. The question is not, “Should we create a more diverse and efficient transportation system?” but rather “How should we create a more diverse and efficient transportation system?”

References

Cynthia Burbank (2008), *Global Climate Change: Transportation's Role in Reducing Greenhouse Gas Emissions*, Climate Change Workshop, Federal Highway Administration; at www.fhwa.dot.gov/hep/climate/gccalbany.htm.

Cambridge Systematics (2009), *Moving Cooler: Transportation Strategies to Reduce Greenhouse Gas Emissions*, co-sponsored by the Natural Resources Defense Council (NRDC), American Public Transportation Association (APTA); Environmental Defense Fund; U.S. Environmental Protection Agency (EPA); Federal Highway Administration (FHWA); Federal Transit Administration (FTA); Intelligent Transportation Society of America (ITSA); Kresge Foundation; Rockefeller Foundation; Shell Oil; Surdna Foundation; Funders Network for Smart Growth; and the Urban Land Institute; summary at http://commerce.uli.org/misc/movingcoolerexecsum.pdf.

CBO (2003), *Fuel Economy Standards Versus A Gasoline Tax*, Congressional Budget Office (www.cbo.gov); at www.cbo.gov/ftpdocs/49xx/doc4917/12-24-03_CAFE.pdf.

CCAP (2009), *How Much Can We Slow VMT Growth? The Potential Savings of Implementing Best Practice Everywhere*, Center for Clean Air Policy (www.ccap.org); at www.ccap.org/docs/resources/460/How%20much%20can%20we%20slow%20VMT%20growth%20May%202008.pdf.

Commerce Committee (2009), *Federal Surface Transportation Policy and Planning Act of 2009*, U.S. Senate Commerce Committee (http://commerce.senate.gov/public/index.cfm).

CPDR (2008), "CP&DR's SB 375 Resources Page," *California Planning & Development Report*, (www.cp-dr.com); at www.cp-dr.com/node/2185.

ECMT (2008), *Cost and Effectiveness of Policies to Reduce Vehicle Emissions*, European Conference of Ministers of Transport; at www.internationaltransportforum.org/jtrc/DiscussionPapers/DP200809.pdf.

Reid Ewing, Keith Bartholomew, Steve Winkelman, Jerry Walters and Don Chen (2007), *Growing Cooler: The Evidence on Urban Development and Climate Change*, Urban Land Institute and Smart Growth America (www.smartgrowthamerica.org/gcindex.html).

Ryan Falconer and Professor Peter Newman (2008), "Transport Policy for a Fuel Constrained Future: An Overview of Options" *World Transport Policy & Practice* (www.eco-logica.co.uk), Volume 14, Number 3, pp. 31-45; at www.eco-logica.co.uk/pdf/wtpp14.3.pdf.

David L. Greene (2003), *Reducing Greenhouse Gas Emissions From U.S. Transportation*, Pew Center of Global Climate Change; at www.pewclimate.org/docUploads/ustransp.pdf.

Holt, et al. (2009), *H. R. 2724: To Amend Title 49, United States Code, To Establish National Transportation Objectives And Performance Targets For The Purpose Of Assessing Progress Toward Meeting National Transportation Objectives*, U.S. Congress; at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h2724ih.pdf.

HUA (2009), *Contact your Senators and ask them to OPPOSE S. 1036! - Action Alert*, Highway Users Federation (www.highways.org); at http://capwiz.com/highway/issues/alert/?alertid=13480606.

Ray LaHood (2009), *Smart Community Planning, More Transportation Options Lead To Reduced Carbon Emissions*, FastLane; Official Blog of the Secretary of Transportation; at http://fastlane.dot.gov/2009/07/smart-community-planning-more-transportation-options-lead-to-a-reduced-carbon-emissions.html.

Kathleen Leotta (2007), *Implementing the Most Effective TDM Strategies to Quickly Reduce Oil Consumption*, Post Carbon Cities (http://postcarboncities.net); at http://postcarboncities.net/files/Leotta_ImplementingTDMtoQuicklyReduceOilConsumption.pdf.

Todd Litman (2005), "Efficient Vehicles Versus Efficient Transportation," *Transport Policy*, Volume 12, Issue 2, pp. 121-129; at www.vtpi.org/cafe.pdf.

Todd Litman (2006), "Changing Travel Demand: Implications for Transport Planning," *ITE Journal*, Vol. 76, No. 9, (www.ite.org), September, pp. 27-33; at www.vtpi.org/future.pdf.

Todd Litman (2007a), *Smart Transportation Emission Reduction Strategies*, VTPI (www.vtpi.org); at www.vtpi.org/ster.pdf.

Todd Litman (2007b), *Guide to Calculating Mobility Management Benefits*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/tdmben.pdf.

Todd Litman (2008), *Land Use Impacts On Transport: How Land Use Factors Affect Travel Behavior*, VTPI (www.vtpi.org); at www.vtpi.org/landtravel.pdf.

Todd Litman (2008), *Socially Optimal Transport Pricing and Markets*, VTPI (www.vtpi.org); at www.vtpi.org/sotpm.pdf.

Todd Litman (2009), "Response to Alan Pisarski's article 'The Nexus of Energy, Environment and the Economy: A Win, Win, Win Opportunity'" (www.ite.org/mega/JB09AA30.pdf), *ITE Journal* (www.vtpi.org/ITE_letter_may2009.pdf).

Todd Litman and David Burwell (2006), "Issues in Sustainable Transportation," *International Journal of Global Environmental Issues*, Vol. 6, No. 4, pp. 331-347; at www.vtpi.org/sus_iss.pdf.

OECD (2009), *OECD Fact Book*, Organization for Economic Co-operation and Development (www.oecd.org); at www.oecd.org/site/0,3407,en_21571361_34374092_1_1_1_1_1,00.html.

Ian W.H. Parry (2005), *Is Pay-As-You-Drive Insurance a Better Way to Reduce Gasoline than Gasoline Taxes?*, Resources for the Future; at www.rff.org/Documents/RFF-DP-05-15.pdf.

Alan Pisarski (2009a), "The Nexus of Energy, Environment and the Economy: A Win, Win, Win Opportunity," *ITE Journal*, January, pp. 30-41; at www.ite.org/mega/JB09AA30.pdf.

Alan Pisarski (2009b), *ULI Moving Cooler Report: Greenhouse Gases, Exaggerations and Misdirections*, New Geography (www.newgeography.com); at www.newgeography.com/content/00932-uli-moving-cooler-report-greenhouse-gases-exaggerations-and-misdirections.

Robert Poole (2009), "Reducing Greenhouse Gas Emissions Without Reducing Mobility," *Reason Foundation Public Works Financing*, Issue 68; http://reason.org/news/show/1007715.html.

Robert Poole (2009), "Targeting VMT: A Terrible Idea," *Surface Transportation Innovations*, Issue 68, June; http://reason.org/newsletters/stinnovations.

Richard H. Pratt (1999-2009), *Traveler Response to Transportation System Changes*, TCRP Report 95, TRB (www.trb.org); at www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=1034.

Peter Samuel and Todd Litman (2001), "Optimal Level of Automobile Dependency; A TQ Point/Counterpoint Exchange," *Transportation Quarterly*, Vol. 55, No. 1, Winter, pp. 5-32; at www.vtpi.org/OLOD_TQ_2001.pdf.

Sam Staley and Adrian Moore (2008), *Mobility First: A New Vision for Transportation in a Globally Competitive Twenty-First Century*, Rowman & Littlefield.

UKERC (2009), *What Policies Are Effective At Reducing Carbon Emissions From Surface Passenger Transport? A Review Of Interventions To Encourage Behaviroual And Technological Change*, UK Energy Research Centre; at www.ukerc.ac.uk/ResearchProgrammes/TechnologyandPolicyAssessment/0904TransportReport.aspx.

VTPI (2008), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm).

Steve Winkelman, Allison Bishins and Chuck Kooshian (2009), *Cost-Effective GHG Reductions Through Smart Growth & Improved Transportation Choices*, Center for Clean Air Policy (www.ccap.org); at www.ccap.org/docs/resources/677/CCAP%20Smart%20Growth%20-$%20per%20ton%20CO2%20_June%202009_%20FINAL.pdf.

Yang, et al. (2008), *80in50 Scenarios for Deep Reductions in Greenhouse Gas Emissions from California Transportation*, Institute of Transportation Studies, University of California (http://steps.ucdavis.edu); at http://steps.ucdavis.edu/research/Thread_6/80in50.