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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Abstract
This report investigates whether transportation policies should include targets to reduce vehicle travel and encourage use of alternative modes, called mobility management or transportation demand management (TDM). Such objectives may be justified on several grounds: they help solve various problems and provide various benefits; they help insure consistency between short- and long-term planning decisions; and they help prepare for future travel demands. Many mobility management strategies are market reforms that increase transport system efficiency and equity. Mobility management criticism tends to reflect an older, automobile-oriented planning paradigm that 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

Many jurisdictions have targets to reduce vehicle miles of travel (VMT) and increase use of non-auto modes (walking, bicycling, public transit, etc.) in order to achieve various economic, social and environmental goals. For example, California state law requires that per capita vehicle travel be reduced 15% by 2050 (GOPR 2018). Washington State requires 30% reductions by 2035 and 50% by 2050 (WSL 2008). British Columbia’s target is to reduce light-duty vehicle travel 25% between 2020 and 2030, and approximately double the share of trips made by walking, bicycling and public transit to 50% by 2050 (Clean BC 2021). Minnesota’s goal is to reduce state vehicle travel by 20% by 2050 (Bellis 2021). The United Kingdom has a goal that by 2030, half of all urban journeys will be by bicycle or walking (DfT 2020). Scotland has a target to reduce vehicle travel by 20% by 2030 (Reid 2020). Many cities also have VMT reduction targets (ACEEE 2019; Klein 2019; Thorwaldson 2020). Guides and tools are now available for designing and evaluating VMT reduction plans (Byars, Wei and Handy 2017; Caltrans 2020; TransForm 2009).

Examples of Local VMT Reduction Policies and Targets (ACEEE 2019; Klein 2020; PBOT 2021)

- **Boston**: put every home within 10 minutes of public transport, bike share, and car share by 2050.
- **Columbus**: Create “smart mobility hubs,” to help residents travel without a car.
- **Minneapolis**: reduce VMT 40% by 2040 through walking, bicycling, public transit and compact development.
- **Orlando**: most local trips are done on foot, bike, carpooling, or transit.
- **Phoenix**: by 2050, 90% of residents live within a half-mile of transit, and 40% commute by non-auto modes.
- **Portland**: reduce vehicle travel and associated emissions by 45%.
- **San Antonio**: reduce average daily vehicle-miles per capita from 24 now to 19 by 2040.

Some critics argue that such targets are misguided. Highway advocacy groups (HUA 2009), activist organizations (Poole 2009; O’Toole 2009; Cox 2009), and some transport policy experts (Pisarski 2009a) argue that VMT reduction policies are costly, unfair, and harmful to consumers and the economy. Some environmental advocates argue that “clean vehicle” strategies, such as shifting to hybrid and electric vehicles, are more effective at reducing emissions than VMT reductions (Hawken 2017). Poole (2009a) calls VMT reduction goals “a terrible idea” and challenges proponents to prove they are cost effective. I accept that challenge.

VMT reduction policies are not necessarily the most effective way of achieving any single goal but are often cost effective considering all impacts (benefits and costs). They can:

- Help achieve multiple community goals including congestion reduction, facility cost savings, consumer savings, investment fairness between drivers and non-drivers, public health, traffic safety, improved mobility for non-drivers, energy conservation and emissions reductions.
- Align policies between different levels of government and organizations, for example, to ensure consistency between local, state and federal policies.
- Respond to changing travel demands and community priorities (ITF 2021a).

This report investigates these issues. It discusses justifications for VMT reduction targets and evaluates criticisms of these policies. It discusses how mobility management objectives can help create a transport system that better responds to future needs.
Accessibility versus Mobility
To understand this issue it is useful to consider the distinction between accessibility (people’s ability to reach desired goods, services and activities) and mobility (physical movement). Accessibility is the ultimate goal of most transportation activity, excepting the small portion of travel for which movement is an end in itself such as jogging or cruising; even recreational travel usually has a destination such as a picnic site or resort (Litman 2003; Sundquist, McCahill and Brenneis 2021). The key question in this analysis is whether it is possible to achieve accessibility with less mobility.

Planning decisions often involve tradeoffs between different types of access accessibility. For example, wider roads and increased traffic volumes and speeds reduce pedestrian access, and therefore public transit access since most transit trips involve walking links; automobile-oriented land use patterns (dispersed, urban fringe development with abundant parking) tends to be difficult to access by walking, cycling and public transit; and resources devoted to automobile transport are unavailable for alternative modes.

VMT reduction critics tend to assume that transportation means automobile travel, so any reduction in vehicle travel reduces accessibility. VMT reduction advocates tend to consider a broader range of accessibility factors, so VMT reductions need not reduce accessibility if implemented with improvements to alternative modes and more accessible land use development. They argue that appropriate VMT reduction strategies can improve overall accessibility, transport system efficiency, and user benefits.

VMT reduction advocates argue that current planning practices are distorted in various ways that favor automobile dependency, and therefore result in economically excessive vehicle travel, that is, vehicle travel for which total costs exceed total benefits (Boarnet 2013; Garceau, et al. 2013; Levine 2006). For example, automobile travel is significantly underpriced (road, parking, insurance and fuel prices do not reflect marginal costs); a major portion of transport funding is dedicated to roads and parking facilities and cannot be used for other modes or mobility management strategies even if they are more cost effective overall; and many land use planning practices discourage compact, mixed, infill development (Litman 2014a). Correcting these distortions tends to reduce automobile travel in ways that increase economic efficient and benefits consumers overall (Clarke and Prentice 2009).

California state law, SB 743 (2013), requires that transportation project environmental impacts be evaluated based on their vehicle miles travelled (VMT) rather than roadway level of service (LOS), which is sometimes called a shift from LOS to VMT (Lee and Handy 2018). Governor Executive Order (EO) N-19-19 (2019) requires state agencies to reduce greenhouse gas emissions. The California State Transportation Agency (CalSTA 2021) and the Northern California Institute of Transportation Engineers (ITE SB 743 Task Force 2021) have developed guidelines for applying these policies to transportation planning decisions. These policies support a shift from mobility-based to accessibility-based planning, which recognizes that improvements to non-auto modes and more accessible land use development policies can increase accessibility while reducing mobility. For example, these policies recognize the important roles that walking, bicycling and public transit play in an efficient and equitable transportation system; reform transportation funding favor efficient modes; and favor infill development over urban expansion.
How Much Vehicle Travel Do People Need?

Per capita vehicle travel varies significantly among U.S. urban regions, as illustrated below.

**Figure 1**  
Per Capita Vehicle Travel in Selected Urban Regions (FHWA 2018)

Per capita daily vehicle-miles range from less than 16 to more than 50 among U.S. urban regions.

There are similar ranges within an urban region. Daily VMT are about three times higher in suburban locations than in compact, multimodal neighborhoods, as illustrated below.

**Figure 2**  
Household VMT by Neighborhood Type (Salon 2014)

Per capita average daily vehicle-miles vary significantly within urban regions.
This indicates that vehicle travel is highly variable, depending on geographic and economic factors. There is no evidence that residents of high vehicle-miles communities access more activities or are more productive than lower vehicle-miles communities. In fact, lower vehicle-miles communities tend to have more economic productivity and residents spend less total time travelling than in higher vehicle-miles areas, as described later in this report. In other words, you can say that automobile-dependent areas are less efficient at providing accessibility: residents must travel further to reach desired services and activities. This is not to say that automobile dependency is bad, but it is costly in terms of time and travel expenses.

**Figure 3** **Optimal Automobile Mode Shares** (Litman 2014b)

![Optimal Automobile Mode Share](image)

The optimal level of automobile travel declines with density and poverty. In affluent, sprawled suburbs, most trips can be by automobile, but this should decline as densities or poverty increases, and should be less than 30% in most urban neighborhoods. Various demand management strategies can be used to favour more space-efficient and affordable modes over private automobiles.

The key issue for this discussion is whether, given better transportation options and incentives, transportation systems could become more efficient, so people can meet their accessibility needs with fewer vehicle-miles. To justify high rates of automobile travel, VMT reduction critics sometimes describe a type of trip that is best made by automobile. “You can’t move furniture by bicycle,” or “It would take me three times longer to commute by public transit than by car.” This may be true, but does not prove that vehicle travel reductions are infeasible. The fact that some trips are best made by automobile does not mean that all trips should be made by automobile, or that current levels of vehicle travel are optimal.

Evidence discussed later in this report indicates that, given better options and incentives, a major portion of vehicle travel could be reduced in ways that are cost-effective overall. The key is to focus on the most changeable trips. Some people assume that there are few ways to reduce mileage, for example, arguing that vehicle travel reductions are only achievable in large cities with high quality public transit, and are therefore infeasible in rural area. However, motorists actually have many ways to reduce mileage, by choosing closer destinations, consolidating trips, shifting modes, and using mobility substitutes (telecommunications and delivery services). Since rural residents currently drive relatively high annual miles, they are often able to achieve relatively large mileage reductions. New technologies can significant improve non-auto accessibility. For example, the COVID pandemic demonstrated that telecommunications and delivery services can substitute for many vehicle trips, studies suggest that e-bikes could substitute for 10-30% of local trips, and integrated navigation and payment apps can make ridesharing, and public transit services more convenient for many trips.
There are two related challenges to vehicle travel reductions. First, although automobiles are expensive to own, their variable costs are low, typically costing just 10-15¢ per vehicle-mile. After spending thousands of dollars a year in fixed expenses, vehicles, owners often feel that they should maximize their mileage in order to get their money’s worth from their large investments. In addition, for many people driving is more prestigious than other modes; they feel embarrassed walking, bicycling or using public transit. As a result, motorists often drive even when they have good alternatives, such as to local destinations within convenient walking and bicycling distance, and on urban corridors with frequent public transit services.

The second challenge is that mobility options have strong economies of scale. If most people in a community rely on automobiles, other modes are likely to be inefficient and stigmatized. For most of the last century, most communities have experienced a self-reinforcing cycle of automobile-oriented transportation planning and sprawled development patterns which create automobile-dependent communities.
Mobility Management Defined

Mobility management (also called transportation demand management [TDM] and VMT reduction strategies) refers to policies and programs that change travel activity to increase transport system efficiency (VTPI 2008; ICAT 2020; TfA and SGA 2020). Table 1 lists common mobility management strategies.

Table 1  Mobility Management Strategies (ICAT 2020; ITF 2021; VTPI 2008)

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

This table lists various mobility management strategies.

Mobility management is more than individual solutions to individual problems, such as road pricing to reduce congestion and transit improvements to reduce pollution; it is most effective if implemented as an integrated program that includes improved transport options and incentives to use the most efficient option for each trip. It is supported by professional organizations such as the Institute of Transportation Engineers and the Federal Highway Administration. Even roadway expansion advocates often support some mobility management strategies such as efficient road and parking pricing (Staley and Moore 2008). It reflects a paradigm shift, as summarized in Table 2.

Table 2  Transport Planning Paradigm Shift (Litman and Burwell 2006)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Old Paradigm</th>
<th>New Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of transportation</td>
<td>Vehicle travel – mobility</td>
<td>Accessibility (ability to reach desired goods, services and activities)</td>
</tr>
<tr>
<td>Modes considered</td>
<td>Automobile and truck</td>
<td>All modes (walking, cycling, public transit, automobile, telework, etc.)</td>
</tr>
<tr>
<td>Land use development</td>
<td>Low-density, automobile-dependent</td>
<td>Compact, mixed, multi-modal</td>
</tr>
<tr>
<td>Performance indicators</td>
<td>Vehicle traffic speeds, roadway Level-of-Service</td>
<td>Multi-modal Level-of-Service, overall accessibility</td>
</tr>
<tr>
<td>Favored improvements</td>
<td>Expanded road and parking capacity, increased traffic speeds</td>
<td>Multi-modal improvements, mobility management,</td>
</tr>
</tbody>
</table>

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

Disagreements about the merit of mobility management often reflect differences in analysis scope – the range of benefits and costs considered. Critics generally consider just one or two benefits, while proponents consider more, including some often overlooked in conventional
transport project evaluation such as parking cost savings, vehicle ownership cost savings, and health impacts. For example, Poole (2009) and Pisarski (2009a) criticize VMT reduction policies as an inefficient way to reduce pollution emissions; such criticism would be justified if pollution reduction was the only benefit these policies provide, but when other impacts are considered mobility management is often cost effective overall.

Critics often assume that everybody (at least, everybody who matters) drives, and so ignore the benefits of improving mobility for non-drivers. They tend to assume that past vehicle travel growth rates will continue into the future. They ignore current demographic and economic trends (aging population, rising fuel prices, increased urbanization, increasing traffic congestion, and increased health and environmental concerns) which are reducing VMT growth and increasing the value of alternative modes (NAR 2020).

**Figure 4** U.S. Average Annual Vehicles Mileage (FHWA, Various Years)

Per capita motor vehicle travel increased during the Twentieth Century but peaked about 2000. Many current demographic, economic and technical trends are reducing vehicle travel demand.

Mobility management critics often ignore rebound effects (also called takeback or induced travel effects) the additional vehicle travel that results from roadway expansion and increased vehicle fuel economy (Moshiri and Aliyev 2017). Ignoring these effects exaggerates the value of highway expansion and fuel efficiency standards and so undervalues mobility management solutions. Critics often argue that mobility is very inelastic, citing research Small and Van Dender (2007) which implies that even large price increases have little effect on vehicle travel. But that study was based on U.S. data from 1960 to 2000, a unique period of rising vehicle ownership, increasing employment and real incomes, declining real fuel prices, highway expansion, declining transit service quality, and suburbanization. More recent analysis indicates that motorists are becoming more price sensitive (Brand 2009; Litman 2010).
Mobility Management Justifications

This section discusses justifications for mobility management and therefore VMT reduction targets.

Helps Solve Multiple Problems and Provide Multiple Benefits

The old planning paradigm was reductionist: each problem was assigned to a profession or agency with narrowly defined responsibilities: transportation agencies were responsible for reducing traffic congestion, health agencies for improving public fitness and health, and environmental agencies for reducing pollution. This can result in those organizations rationally implementing solutions that contradict other community goals, and tends to undervalue solutions that provide multiple benefits. The new paradigm is more comprehensive, and so searches for win-win solutions that help achieve multiple community goals, such as congestion reduction strategies that also increase public fitness and reduce pollution.

Mobility management tends to provide many benefits (VTPI 2008). Although a particular mobility management strategy may not be the most cost effective solution to a single problem, it is often the most beneficial strategy overall, considering all impacts. For example, considering just short-term congestion impacts, highway widenings often seem justified, and considering just emission reductions, alternative fuel vehicle subsidies often seem justified, but those strategies provide a limited range of benefits, and tend to induce additional vehicle travel, which reduces their intended benefits and increases other problems. By reducing congestion delays, urban roadway expansions tend to induce additional vehicle travel, which over the long run increases downstream congestion, crashes and pollution emissions. Similarly, by reducing fuel costs, efficient and alternative fueled vehicles tend to increases total vehicle travel and therefore congestion, infrastructure costs, crashes and sprawl-related costs. Mobility management strategies tend to achieve many planning objectives, as illustrated in Table 3.

Table 3 Comparing Strategies (Litman 2011)

<table>
<thead>
<tr>
<th>Planning Objective</th>
<th>Roadway Expansion</th>
<th>Fuel Efficient Vehicles</th>
<th>Mobility Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Vehicle Travel</td>
<td>Increased</td>
<td>Increased</td>
<td>Reduced</td>
</tr>
<tr>
<td>User convenience and comfort</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Congestion reduction</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Road and parking cost savings</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Consumer savings</td>
<td>✓/×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reduced traffic accidents</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Improved mobility options</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Energy conservation</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pollution reduction</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Physical fitness &amp; health</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Economic development</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Land use objectives</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

(✓ = Achieve objectives. × = Contradicts objective.) Roadway expansion and more fuel efficient vehicles provide a limited range of benefits, and by increasing total vehicle travel they can exacerbate other problems such as congestion, accidents and sprawl. Win-Win Solutions tend to reduce total vehicle travel and increases economic efficiency, which helps achieve many planning objectives.
Increases Efficiency and Fairness

Mobility management includes various reforms that increase economic efficiency and equity. An efficient transport system should 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 policies and planning practices are distorted in various ways that tend to increase motor vehicle travel beyond what is economically optimal, as summarized in Table 4.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Transport Planning Distortions (Clarke and Prentice 2009; Litman 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>Inadequate consumer options</td>
<td>Consumers often have limited alternatives to automobile transportation and automobile-oriented location.</td>
</tr>
<tr>
<td>Efficient Pricing</td>
<td>Many motor vehicle costs are fixed or external.</td>
</tr>
<tr>
<td>Transport Planning Practices</td>
<td>Transportation planning and investment practices favor automobile-oriented improvements, even when other solutions are more cost effective.</td>
</tr>
<tr>
<td>Land Use Policies</td>
<td>Current land use planning policies encourage lower-density, automobile-oriented development.</td>
</tr>
</tbody>
</table>

This table summarizes various transportation market distortions and potential reforms.
These distortions help create a self-reinforcing cycle of increased automobile dependency and sprawl (Figure 5). Mobility management tends to correct these distortions, leading to more balanced and efficient transport systems.

**Figure 5  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.

Various policy and planning reforms are justified on economic efficiency and planning principles, such as more efficient road, parking, insurance and fuel pricing; more comprehensive and integrated planning; least-cost funding and neutral tax policies. Transportation professionals categorize these reforms as mobility management strategies.

Critics might argue that VMT reductions should be an outcome of market reforms rather than planning objectives. They could suggest, “Let’s just implement efficient pricing and let consumers decide how much to reduce their mobility.” But the first step in reforming outdated policies is to establish new goals and performance targets. VMT reduction targets are often the best way to begin implementation of economically-justified policy and planning reforms; they focus political and institutional actions toward reform. For example, VMT reduction targets encourage legislative changes to support efficient road and parking pricing, and for transportation agencies to apply least-cost investments and develop more multi-modal planning practices. Similarly, these targets encourage local governments to reform zoning codes and implement more efficient parking management.

**Least-Cost Planning** (Lindquist and Wendt 2012)

*Least-cost planning* is a planning framework that implements the most cost-effective solution to a problem, considering all impacts (costs and benefits), giving equal consideration to demand management as capacity expansion. This tends to justify far more implementation of mobility management solutions than what occurs under current planning practices which consider a limited set of planning goals and have dedicated funds for facility improvements that cannot be used to implement mobility management strategies.
Provides Strategic Guidance for Individual Policy and Planning Decisions

A 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 individual policy and planning decisions so they are more integrated. 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.

Many policy and planning decisions affect the amount of mobility that occurs in an area, as summarized in Table 5. Although individually decisions that stimulate automobile travel may seem modest and justified, their impacts are cumulative and synergistic. 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; TransForm 2009).

Table 5 Examples of Policy and Planning Decisions That Affect Mobility

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

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

Conventional planning tends to ignore these long-term impacts. Many transport and land use policy decisions are based on narrow, short-term objectives with little consideration of strategic 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, which increases traffic congestion, accidents, energy consumption and pollution emissions. VMT reduction targets encourage decision makers to choose the congestion reduction strategies that also help reduce parking problems, and the parking solutions that also help reduce congestion problems. Such comprehensive, strategic planning maximizes efficiency and benefits.
Responds to Changing Travel Demands
Many demographic, economic and technical trends are reducing demand for automobile travel and increasing demand for other mobility and accessibility options.

Trends Shifting Travel Demands (Litman 2006)

- **Vehicle saturation.** During the last decade per capita vehicle ownership and annual mileage have reached saturation levels. Although total traffic may increase somewhat in areas with rapid population growth, growth rates will be much lower than what occurred during the last century and many areas will experience no growth or even negative VMT growth.

- **Aging population.** As the Baby Boom generation retires per capita vehicle travel will decline and their demand for alternatives will increase.

- **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 and parking congestion.** This increases the relative value of alternative modes that reduce urban traffic congestion.

- **Rising roadway construction costs.** This reduces the feasibility and economic justification of major urban highway expansion.

- **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.

- **Technological innovations that improve alternatives.** Many new transportation technologies and services (telework, vehicle sharing services, multi-modal navigation and payment apps, delivery services, etc.) help residents reduce their vehicle ownership and use.

As a result of these trends, per capita annual automobile travel has peaked in most wealthy countries (Figure 4), and demand for alternatives is growing.¹ This is not to suggest that automobile travel will disappear, but vehicle travel demand will grow much less than in the past and demand for alternative modes will 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.

¹ 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.
Evaluating Criticisms
This section evaluates specific criticisms of mobility management objectives.

**Harms Consumers**
Critics argue that, since consumers freely choose automobile travel and automobile-dependent locations, they must be harmed by vehicle travel reduction and smart growth policies (Pisarski 2009a and 2009b; Moore, Staley and Poole 2010). This is not necessarily true: many mobility management strategies use positive incentives that directly benefit consumers by improving travel options or rewarding vehicle travel reductions (Table 6), and real estate market research indicates that consumers increasingly prefer smart growth home locations (NAR 2020).

**Table 6**  
**Mobility Management Strategy Impacts** (VTPI 2008)

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

This table categorizes mobility management strategies according to user impacts. Far more provide positive than negative incentives, and even negative incentives, such as road pricing, can benefit users overall if revenues are used to reduce other taxes or provide new valued services.

Even negative incentives, such as higher fees or traffic calming, can benefit consumers overall. For example, people who drive less due to higher road tolls, parking fees or fuel prices may be better off overall if revenues are used to reduce other taxes or provide new valued services, or if they benefit from reduced congestion, accident risk, pollution exposure, or less need to chauffeur non-driving relatives and friends (Litman 2007b).

Although it would be inefficient to reduce vehicle travel arbitrarily, for example, by randomly forbidding vehicle trips or closing roads, 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.
Harms the Economy
Some critics argue that because vehicle travel tends to increase with economic development, any effort to reduce vehicle travel is economically harmful. For example, the Highway Users Alliance (HUA 2009) claims that the graph below proves that, because VMT and GDP are correlated, efforts to reduce vehicle travel must reduce economic productivity.

**Figure 6**  
US VMT and GDP Trends (HUA 2009)

Since 1950, the cumulative correlation rate between VMT and Real GDP, calculated using Pearson’s R, is [graph]. This is an extraordinarily strong correlation even when calculating the R-square value of 98.9% which indicates the predictive value between the two variables (VMT or GDP).

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.

Similarly, economist Randall Pozdena claims that Figure 7 proves there is a strong positive relationship between income and energy use, and that because recessions often follow petroleum price spikes, efforts to reduce per capita vehicle travel reduce economic productivity. He concludes that, “a one percent change in VMT/capita causes a 0.9 percent change in GDP in the short run (2 years) and a 0.46 percent in the long run (20 years).” This analysis misrepresents these issues in important ways.

The log-log format in Figure 7 is a visual trick that exaggerates the relationships between energy and economic development. For example, although the U.S. and Norway are located close together, Norwegians actually consume about half as much fuel per capita as U.S. residents. The graph includes countries with very different levels of industrialization. An increase in per capita vehicle travel in very poor countries such as Zimbabwe and Liberia has a very different productivity impacts than in wealthy, industrialized countries. Similarly, although oil price spikes harm oil consumers, gradual and predictable fuel tax increases can be economically beneficial by encouraging energy conservation and reducing the wealth transferred to oil producers.
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Figure 7  Per Capita GDP Versus Barrels of Oil (Pozdena 2009)

Pozdena claims this graph proves that increased energy consumption increases economic productivity. A log-log graph such as this exaggerates such relationships.

Certainly energy use, vehicle travel and GDP tend to increase together, as figures 3 and 4 indicate, but this reflects several factors:

1. Motor vehicle travel can increase economic productivity, particularly when used for high value transport such as freight and service delivery, business travel and emergency trips.
2. Increased wealth tends to increase vehicle ownership and use, although marginal impacts decline as illustrated in Table 7.

Table 7  Annual Per Capita Vehicle Mileage by Income Quintile (BLS 2007)

<table>
<thead>
<tr>
<th>Income Quintile:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income before taxes</td>
<td>$6,195</td>
<td>$12,579</td>
<td>$18,485</td>
<td>$24,986</td>
<td>$49,496</td>
</tr>
<tr>
<td>Annual mileage</td>
<td>4,733</td>
<td>6,182</td>
<td>7,440</td>
<td>7,926</td>
<td>8,885</td>
</tr>
<tr>
<td><em>Mileage increase per $1,000 additional income</em></td>
<td>764</td>
<td>227</td>
<td>213</td>
<td>75</td>
<td>39</td>
</tr>
</tbody>
</table>

Increased wealth causes declining marginal mileage increases.

3. Increased wealth allows some wealthy households to choose more accessible locations, allowing them to reduce their vehicle travel.
4. Vehicle travel imposes external costs (congestion, accident damages, import exchange burdens, pollution emissions) that can reduce economic productivity.
5. Increased vehicle travel tends to create more automobile-dependent transport system and dispersed land use patterns which increases the amount of travel needed to maintain a given level of accessibility. This tends to reduce economic productivity.
Only Factor 1 causes wealth to increase with VMT, while factors 2-5 result from increased wealth. Factors 1 and 2 cause positive relationships between VMT and GDP, while factors 3, 4 and 5 cause negative relationships. Because these effects vary, the overall relationships between vehicle travel and economic productivity depend on specific conditions, including a region’s level of development, economic factors such as the costs of importing fuel, and the policies that are applied.

It is unsurprising that VMT and GDP correlate since vehicle expenditures account for a significant portion of household, business and government consumption (typically 15-25% in automobile-oriented regions), so all else being equal, doubling VMT increases GDP about 10%. However, this does not necessarily reflect increased social welfare: it could simply reflect an increase in costs. For example, policies that stimulate sprawl will increase both VMT and GDP, since residents must drive more annual miles, spend more on vehicles and fuel, although consumers and society could be worse off overall. In such situations, VMT reductions can support economic development (Zheng, et al. 2011).

Researchers find weak or negative relationships between personal vehicle travel and economic productivity (Angel and Blie 2015; Ecola and Wach 2012; Kooshian and Winkelman 2011; McMullen and Eckstein 2011). Empirical evidence suggests that increasing from very low to moderate levels of mobility increases productivity since motor vehicles are used for high-value trips, but at higher levels of per capita VMT, marginal benefits decline and eventually becomes negative as external costs and inefficiencies increase (Kooshian 2011; Zheng, et al. 2011). An international study found that per capita vehicle ownership peaks at about $21,000 (1997 U.S. dollars) annual income (Talukadar 1997). Similarly, a World Bank study found that beyond an optimal level (about 7,500 kilometers annual motor vehicle travel per capita, with considerable variance due to geographic and economic factors), vehicle travel marginal costs outweigh marginal benefits (Kenworthy, et al. 1997). The researchers conclude that, “there are no obvious gains in economic efficiency from developing car dependence in cities,” and, “There are on the other hand significant losses in external costs due to car dependence.”

Among wealthy countries there is considerable variation in per capita vehicle travel. Although per capita VMT grew during most of the last century, it has saturated in most wealthy countries and the level at which this saturation occurs varies depending on transport and land use policies (Millard-Ball and Schipper 2010). The U.S. averages more than twice the per capita vehicle travel as most other OECD countries, as indicated in Figure 8. Of particular interest is Norway, which produces petroleum but maintains high fuel prices and has other policies to discourage vehicle travel and support 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.
Per capita vehicle mileage is significantly higher in the U.S. than in other industrialized countries. Residents of wealthy countries such as Switzerland, Norway and Sweden drive about half as much as in the U.S. due to policies and planning practices that increase transport system efficiency.

Similarly, annual per capita vehicle mileage varies significantly among U.S. cities, from fewer than 6,000 average annual vehicle-miles per capita to more than 15,000, as indicated in Figure 1. Although many factors influence these differences, they result, in part from transport and land use policies that affect the travel options available, travel incentives, and land use patterns. There is no evidence that lower VMT cities such as Redding, Sacramento, Chicago and Portland, are less economically successful or have inferior quality of life than higher VMT cities such as Atlanta, Houston, Birmingham or Durham; in fact, the lower VMT cities tend to have higher per capita GDP, as indicated later in this report.

The data presented by HUA and Pozdena do not really prove that increased energy consumption and vehicle travel necessarily support economic development. For example, although in an undeveloped country, transport system improvements that cause average per capita annual vehicle travel to rise from 1,000 to 2,000 VMT may increase economic productivity, this does not prove that VMT reduction policies in a developed country, such as more efficient road and parking pricing, and greater investments in alternative modes, which cause average annual vehicle travel to decline from 16,000 to 15,000 VMT reduce productivity, although this is what Pozdena implies. Per capita annual vehicle travel varies widely among wealthy countries due to differences in pricing and planning practices. By reducing costs (congestion, road and parking facility costs, fuel expenses, accident and pollution damages, etc.) they can increase productivity.

Described differently, the amount of vehicle travel and energy required per unit of GDP varies widely. Virtually all developed countries are increasing GDP per unit of energy and mobility, and some extract far more productivity (material wealth and income) per unit of mobility and energy than others, as illustrated in Figure 9, due, in part, to transport policies. All else being equal, policies that increase transport efficiency increase economic productivity and competitiveness. This is sometimes called decoupling (Mraihi 2012; OECD 2006).
Most countries are increasing GDP per passenger-mile, some much more than the U.S.

A rigid relationship between mobility and economic productivity implies that economies are inflexible: there is only one efficient way to produce goods, and that economic development requires ever more energy and movement. A flexible relationship between mobility and economic productivity implies that economies are responsive and creative: if energy and mobility are cheap, businesses and consumer use a lot, but if prices increase or other policies encourage conservation, the economy becomes more efficient. Within developed countries there is a negative relationship between vehicle travel and economic productivity as illustrated in the following figures (also see Kooshian 2011).

Similarly, GDP tends to increase with public transit travel, as illustrated in Figure 9.

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Figure 11  Per Capita GDP and Transit Ridership (VTPI 2009)

GDP tends to increase with per capita transit travel. (Each dot is a U.S. urban region.)

Per capita GDP tends to decline with roadway lane miles, as illustrated in Figure 12.

Figure 12  Per Capita GDP and Road Lane Miles (VTPI 2009)

Economic productivity declines with more roadway supply, an indicator of automobile-oriented transport and land use patterns. (Each dot is a U.S. urban region.)

Per capita GDP tends to increase with population density, as illustrated in Figure 13. These agglomeration efficiencies reflects the benefits that result from improved land use accessibility (reduced distances between activities) and increased transport system diversity, which both tend to increase with density.
**Figure 13** Per Capita GDP and Urban Density (BTS 2006 and BEA 2006)

Productivity tends to increase with population density. *(Each dot is a U.S. urban region.)*

Zheng, et al. (2011) find similar results: per capita economic productivity tends to be higher in states with less automobile-dependent transport systems. Chapple and Makarewicz (2010) analyzed business growth trends in California between 1990 and 2005. They find that most expanding firms locate near transportation infrastructure, such as highways and major airports, but the majority of growth occurred near existing infrastructure in urban areas rather than expanding to undeveloped sites at the urban fringe. They conclude that policies that encourage infill development need not reduce economic development, and may support economic development by improving affordable and accessible housing.

Figure 14 shows that per capita GDP increases with fuel prices, particularly among oil importing countries (“Oil Consumers”). This suggests that, contrary to popular belief, high fuel prices (and therefore, high vehicle operating costs) increase economic productivity and development by increasing transport system efficiency and reducing the wealth lost to importing fuel.
Economic productivity tends to increase with higher fuel prices, indicating that substantial increases in vehicle fees can be achieved without reducing overall economic productivity.

Two factors help explain why GDP tends to decline at high levels of VMT:

1. Marginal productivity benefits decline as a declining portion of travel is for productive uses, such as freight and service delivery, and business travel.

2. The additional VMT imposes increasing economic costs (vehicle expenses, road and parking facility costs, traffic service costs, accident and pollution damages, etc.).

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Summary of Pozdena Critique

Pozdena’s 2009 paper makes the following errors:

- Correlations between energy use, VMT and GDP do not prove causation. Increased wealth often increases energy use and vehicle travel. This does not mean that increases in vehicle travel will increase wealth or reductions in vehicle travel reduce wealth.

- The log-log graph exaggerates the perceived correlation. There is actually considerable variation in per capita energy use and vehicle travel between countries and cities with comparable GDP due to differences in energy and transportation policies.

- Pozdena’s evidence (international data including very low-income countries, long-term trends beginning at the start of the automobile age, and the effects of oil shocks) are not relevant for evaluating the economic impacts of typical mobility management strategies.

- Most experts agree with Pozdena that transportation policy reforms should reflect economic principles, but he only considers congestion and pollution problems, and therefore only supports congestion pricing and carbon taxes. He ignores other market distortions such as inefficient pricing of roadway facilities and crash risk, and underinvestment in non-auto modes. More comprehensive analysis justifies additional mobility management strategies, such as parking and insurance pricing reforms, more comprehensive planning and least-cost funding.

- Pozdena argues that “excessive” fuel taxes, VMT fees, or disincentives to driving are unjustified, although, until other impacts are efficiently priced they can be justified on second-best grounds. For example, until comprehensive road pricing is implemented, higher fuel taxes, VMT fees and parking pricing will provide some congestion and road cost saving benefits.

- Pozdena implies that VMT reductions are implemented primarily by regulations, but most VMT reduction strategies reflect market principles and good planning: more efficient pricing for roads, parking, insurance and fuel; more multi-modal planning and least-cost investment practices; land use planning reforms. This may reflect a semantic confusion: VTM reduction policy targets themselves can be considered a type of regulation, but most of the specific mobility management strategies applied to achieve these targets are not; they are planning and pricing reforms that can be justified for economic efficiency and equity.

- Pozdena assumes that smart growth primarily involves regulations that increase development density (they actually involve a variety of policy reforms, many of which reduce rather than increase regulations, or simply shift development location and design), and that smart growth does not reduce vehicle travel (he claims, incorrectly that “there is no evidence to support implied causality flowing from density to VMT”), reduce transport costs or increase economic productivity. His criticism assumes that consumers dislike smart growth communities so urban living necessarily harms consumers and society. Abundant research indicates otherwise (Levine 2006; Carlson and Howard 2010; NAR 2020).

Transportation market distortions encourage economically inefficient transportation activity, in which marginal costs exceed marginal benefits. More neutral planning and efficient pricing increase economic productivity. For example, more efficient road and parking pricing encourage travelers to use alternative modes under congested conditions, which reduces congestion and parking costs borne by businesses. Even sub-optimal reforms, such as fuel tax increases, can be justified on second-best ground, until optimal policies, such as time- and location-based fees, are fully implemented.
Ignores Mobility Benefits
Critics sometimes argue that motor vehicle travel provides benefits that are overlooked by advocates of VMT reduction targets, but this is generally untrue. Most public officials and planners are quite aware of the benefits of mobility to people and businesses, and its importance in a successful economy. However, they are also aware of the direct and indirect costs that result from excessive motor vehicle travel and the benefits that can result from a more diverse and efficient transportation system. Table 8 indicates mobility management benefits and costs.

**Table 8  Mobility Management Benefits and Costs**

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

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

As discussed earlier, the ultimate benefit of transportation is accessibility. If transportation is defined only as mobility the only solution to traffic and parking congestion is to expand roads and parking facilities. Defining transportation based on accessibility allows a much broader range of solutions to be considered, including improvements to alternative modes and mobility substitutes, pricing incentives, and more accessible land use. Better management can increase the benefits provided by mobility, for example, by reducing traffic and parking congestion so there is less delay when people do drive, and improving travel options so motorists are not required to spend as much time chauffeuring non-driver friends and family members.
**Pollution Reduction Cost Efficiency**

 Critics argue that reducing vehicle travel is an inefficient way to reduce pollution emissions (Poole 2009). This might be true if emission reductions were the only benefit, but VMT reductions can provide many co-benefits and so can be very cost effective considering all impacts. Vehicle travel reductions tend to reduce consumer costs, congestion, infrastructure, crash and sprawl-related costs, while renewable fuel vehicles tend to increase these costs because their lower operating expenses induce additional vehicle travel (Alarfaj, Griffin and Samaras 2021; Litman 2005; Vaughan 2019).

Although electric and hydrogen vehicles are often called “zero emissions,” they actually produce significant emissions over their lifecycle, including their fuel, vehicle and infrastructure production. Figure 15 compares estimated lifecycle energy consumption of various modes, measured per passenger-kilometer. The results indicate that bicycles (including e-bikes) are most energy efficient, followed by mopeds, public transit, and private cars. The least efficient modes are shared vehicles (ridehailing and taxis) due to their additional deadheading travel (empty vehicle-miles required to pick up and drop off passengers). In addition, because they have lower fuel costs, efficient and alternative fuel vehicle owners typically drive 10-30% more annual miles than they would with equivalent fossil fuel vehicles, further reducing their emission reductions and increasing other external costs. This indicates that it would is wrong to assume that shifts to more efficient and alternative fuel vehicles will solve our transportation problems.

![Figure 15](image)

A recent study, “Electrification of Light-Duty Vehicle Fleet Alone Will Not Meet Mitigation Targets,” (Milovanoff, Posen and MacLean 2020) concludes that fleet electrification is an inefficient way to achieve ambitious emission reduction targets due to slow fleet turnover, and the economic and environmental costs of producing the required batteries and accommodating the additional electrical demand. The researchers conclude that vehicle travel reductions are needed to achieve the emission reduction targets.
Some mobility management strategies are particularly effective at achieving environmental goals (Burbank 2008; Cambridge Systematics 2009). For example, fuel tax increases, distance-based insurance and registration fees, more efficient parking management, and land use policy reforms often have modest incremental costs and substantial economic and environmental benefits (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.

**Crowding**

Critics argue that smart growth land use policies cause crowding. This is generally untrue and reflects a misunderstanding of the concept. Although smart growth increases density (people per acre) it does not necessarily increase crowding (people per square foot of interior building space). For example, in a typical 1,800 square foot house requires a 10,000 square foot (quarter acre) lot if it is single-story with a large garage and yard, but the same size house needs only 2,000 square foot if it is three stories with a single car garage and a small yard.

Current and projected market trends favor smart growth (NAR 2020). Demand for dispersed, automobile-dependent housing is declining while demand for housing in more accessible, multi-modal neighborhoods is growing due to factors such as aging population, rising fuel prices and shifting consumer preferences (Thomas 2009). Since sprawl has been the primary development pattern for the last half-century there is still plenty of low-density, single-family, sprawled housing available for people who want it (Leinberger 2008) but the demand for accessible, multi-modal housing will be inadequate (Reconnecting America 2006). Past development policies (such as generous minimum parking requirements and building setbacks, and excessive limits on development density and mix) caused sprawl; it makes sense to change these policies to encourage more urban infill and multi-modal development patterns (Levine 2006).

**Consumer Sovereignty**

*Consumer sovereignty* means that consumers are able to choose the goods that best meet their needs. 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 constitute violates this principle. The Highway User Association claims 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 many current policies and planning practices tend to favor automobile travel over other modes and more dispersed land use development, depriving consumers of options that involve alternative modes or more compact locations. To the degree that current levels of automobile dependency and sprawl result from market distortions, mobility management and smart growth policies help achieve modal neutrality and consumer sovereignty. These policies tend to improve travel and housing options, allowing consumers to choose the combination that best meets their needs. They do not eliminate driving and single-family housing, even with programs that critics consider aggressive and “radical,” automobile travel would continue to have the largest mode share, Americans would continue to drive more than residents of peer countries, and most residents would live in single-family homes in most communities.
**Harms Poor People**

Some studies indicate that economically disadvantaged workers (such as former welfare recipients) tend to work and earn more if they have an automobile, and motor vehicles can provide access to basic services such as medical care and shopping (Baum 2009; Blumenberg and Pierce 2012; Smart and Klein 2015). This leads some people to conclude that vehicle ownership increases social equity, so vehicle travel reduction policies are unfair and harmful to low-income households (Pisarski 2009a). This misinterprets the issues.

The additional income provided by vehicle ownership is, on average, far less than the additional costs, making households financially worse off overall (Smart and Klein 2015). Other studies indicate that high quality public transit also increases labor participation (CTS 2010), even in automobile-oriented cities such as Houston, Texas (Yi 2006). Analysis by Gao and Johnston (2009) indicates that transit improvements provide greater total benefits to all income groups than subsidizing automobiles for lower-income groups.

Automobile subsidies only benefit a subset of disadvantaged people, those able to drive, and incur significant direct and indirect costs. Low income motorists must typically spend $250 to $500 per month to own and operate a vehicle. Their insurance premiums tend to be high, and the older vehicles they own tend to be unreliable, imposing large repair costs. As a result, much of the additional income provided by automobile ownership must be spent on vehicle expenses, reducing net gains. Automobile travel incurs other user costs, including accident risk and reduced physical fitness (APHA 2010; Lachapelle, et al. 2011), and increases external costs imposed on disadvantaged communities including traffic congestion, road and parking facility costs, accident risk, and pollution emissions.

Increased vehicle travel does not necessarily increase overall economic productivity or employment. On the contrary, productivity rates (per capita GDP) tend to increase with transit ridership and decline with automobile use, indicating that a more multi-modal transport system support community economic development (Litman 2010a).

An automobile dependent transportation system is inherently inefficient and inequitable. Subsidies intended to help lower-income people own and operate automobiles treat one symptom but exacerbate other problems. Creating a more diverse and efficient transport system addresses the root of the problem, which provides the greatest total benefits to society, including increased social equity by improving mobility and accessibility for physically, economically and socially disadvantaged people.

This analysis indicates that although automobile use can benefit some disadvantaged people, other transport improvement strategies are often more cost effective and beneficial overall. These include improved walking and cycling conditions, improved rideshare and public transit services, carsharing, distance-based vehicle insurance and registration fees, and more affordable housing in accessible locations (Sullivan 2003; Litman 2010c). These solutions tend to benefit all residents, and especially those who are physically, economically or socially disadvantaged.
### Summary of Mobility Management Impacts

Table 9 evaluates the impacts of various mobility management strategies. Most strategies increase economic efficiency, and many provide direct consumer and equity benefits.

<table>
<thead>
<tr>
<th>Table 9</th>
<th>Impacts of Mobility Management Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td><strong>Efficiency</strong></td>
</tr>
<tr>
<td><strong>Incentives to Choose Efficient Modes</strong></td>
<td></td>
</tr>
<tr>
<td>Congestion pricing</td>
<td>Positive. Reflects efficient pricing.</td>
</tr>
<tr>
<td>Fuel tax increases</td>
<td>Positive if raised gradually and predictably.</td>
</tr>
<tr>
<td>TDM marketing (information and encouragement)</td>
<td>Generally positive, since better information tends to increase efficiency.</td>
</tr>
<tr>
<td>No-drive days</td>
<td>Generally negative.</td>
</tr>
<tr>
<td><strong>Improved Options</strong></td>
<td></td>
</tr>
<tr>
<td>Transit improvements</td>
<td>Mixed. Is cost effective on major urban corridors.</td>
</tr>
<tr>
<td>Walking and cycling improvements</td>
<td>Improvements justified to meet growing demand.</td>
</tr>
<tr>
<td>Rideshare programs</td>
<td>Mixed. Is cost effective on major urban corridors.</td>
</tr>
<tr>
<td>Telework and flextime</td>
<td>Generally cost effective and beneficial.</td>
</tr>
<tr>
<td>Carsharing</td>
<td>Generally cost effective and beneficial.</td>
</tr>
<tr>
<td><strong>Land use Policies</strong></td>
<td></td>
</tr>
<tr>
<td>More flexible zoning (more density, mix, housing types, etc.)</td>
<td>Generally reflects market principles and increases efficiency.</td>
</tr>
</tbody>
</table>

*This table summarizes efficiency, consumer and equity impacts of mobility management strategies.*
Legitimate Criticisms of VMT Reduction Targets

This section discusses legitimate criticisms of VMT reduction targets and mobility management strategies and how they can be addressed.

Some mobility management strategies can be inefficient and unfair. For example, it would be inappropriate to arbitrarily forbid driving at certain times or locations if no suitable alternatives are available. Some strategies, such as “no drive days,” are blunt, they fail to give consumers maximum flexibility so they can reduce their least-valued vehicle travel while retaining higher-value trips. As much as possible, mobility management strategies should reflect market principles, including consumer sovereignty, efficient pricing, and neutral planning.

Mobility management programs can be uncoordinated. For example, it would be inequitable to increase user fees if alternatives (good walking and cycling conditions, convenient ridesharing and public transit service, telework options, affordable housing in accessible communities, etc.) are unavailable. Similarly, it would be inefficient to spend a lot of money on alternative modes (walking and cycling facilities, public transit service improvements, etc.) without sufficient incentives to encourage their use.

Vehicle travel reduction targets are somewhat arbitrary, not based on detailed benefit-cost analysis. However, there are currently many market distortions that favor automobile travel, including underpriced roads and parking facilities, and automobile-oriented planning which underinvests in other modes, resulting in economically excessive vehicle travel (Litman 2014a). Vehicle travel reduction targets can be considered an appropriate way to focus policy and planning decisions to correct these distortions (Thorwaldson 2020).

Mobility management requires public support. For example, it would be inappropriate to tell people that they must reduce their automobile travel without communicating why and how. It will be important to show consumer benefits.

VMT reduction targets may be nothing more than words. For example, a community may establish long-term VMT reduction targets while continuing existing transportation and land use planning practices that stimulate automobile dependency and sprawl. It is important that VMT reduction targets actually lead to positive and rational change.

Two Narratives

This debate reflects two conflicting narratives. Reader must decide which to believe:

1. VMT reduction critics claim that virtually everybody wants to lead high-mileage lifestyles and live in automobile-oriented communities, so vehicle travel reduction policies are futile and harmful.

2. VMT reduction supporters believe that high levels of vehicle travel are an anomaly resulting from a combination of automobile-oriented planning, sprawled development and cheap fuel that result in economically excessive vehicle travel – and given better options and more efficient incentives, many people would drive less, rely more on non-auto modes, live in more compact, multimodal neighborhoods, spend less time and money driving, and be better off overall as a result.
Conclusions
There are many reasons to reform current transportation policies. The last century was the period of automobile ascendency during which it made sense to invest significant resources to build roads and parking facilities, and in other ways accommodate increased motor vehicle travel. The next century requires very different policies. Demographic and economic trends are reducing vehicle travel demand increasing demand for alternative modes. Economic competitiveness will require more efficient transportation systems. To meet these needs, transport policies must place more emphasis on efficient management. No single strategy will suffice: a variety of integrated transport and land use policy reforms are needed to prepare for the future.

To facilitate these changes policy makers can establish mobility management objectives to reduce vehicle travel and increased use of alternative modes. Such objectives help coordinate individual planning decisions to create a more diverse and efficient transportation system.

Mobility management criticism tends to reflect an older planning paradigm which assumes that transportation means driving, and transport agencies have limited responsibilities and solutions. Critics tend to ignore many costs of automobile travel and many benefits of alternatives. The new paradigm applies systems analysis which considers a variety of objectives, impacts and options.

Critics argue that mobility management and smart growth harm consumers and the economy, but such criticisms are often inaccurate and do not apply to appropriate, integrated mobility management programs which reduce vehicle travel in ways that reflect efficient market principles (consumer options, cost-based pricing, neutral policies). Until efficient road, parking, insurance and fuel pricing are fully implemented, and planning practices are more neutral, blunter strategies (such as regulations and subsidies) may be justified to reduce economically excessive automobile travel.

Many VMT reduction critics actually support certain mobility management strategies, such as efficient road and parking pricing, more flexible zoning codes, and ridesharing incentives. Mobility management tends to be most effective if implemented as an integrated program, so some criticism are really justifications for additional strategies, such as investments to improve public transit in conjunction with road pricing. 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 current planning practices.

Mobility management policies help create a transportation system that meets future needs. VMT reduction targets are the first step in implementing such policies.
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