VICTORIA Transport Policy INSTITUTE
EFFICIENCY • EQUITY • CLARITY

www.vtpi.org
Info@vtpi.org
Phone & Fax: 250-360-1560

Win-Win Transportation Solutions

Mobility Management Strategies That Provide Economic, Social and Environmental Benefits

18 December 2014

Todd Litman
Victoria Transport Policy Institute

Abstract

Win-Win Transportation Solutions are cost-effective, technically feasible market reforms that help solve transportation problems by increasing consumer options and removing market distortions that encourage inefficient travel behavior. They provide multiple economic, social and environmental benefits. If fully implemented to the degree that is economically justified, Win-Win strategies would significantly increase transportation system efficiency. They are “no regrets” measures that are justified regardless of uncertainties about global warming or other environmental and social impacts. Because they provide multiple benefits they offer opportunities for cooperation and coordination among various organizations and political interests. This paper discusses the Win-Win concept and describes various Win-Win solutions.

Originally published as:
Todd Litman (2003), “Transportation Demand Management and ‘Win-Win’ Transportation Solutions” Chapter 45, *Handbook of Transport and the Environment*, Elsevier, pp. 805-814.

Contents

Introduction

People often assume that environmental, social and economic goals conflict. For example, policies to reduce pollution emissions and programs to improve mobility for disadvantaged people are often criticized as threats to business and jobs. But such conflicts can be avoided. Some strategies that support environmental and social objectives also benefit the economy.

This report identifies more than a dozen such strategies, which we call *Win-Win Transportation Solutions*. These are cost-effective, technically feasible policy reforms and programs that help solve transport problems by improving transport options and correcting market distortions that result in economically excessive motor vehicle travel.[1] These are *no regrets* strategies because they are justified even if the severity of environmental risks, such as climate change, is uncertain.

To appreciate Win-Win solutions it is necessary to use comprehensive analysis that considers all significant benefits and costs.

Transport planning often starts by defining various transport system *problems* (or *costs*), which describe the conditions that people consider undesirable. Common transport problems can include:

- Inconvenient and uncomfortable travel conditions
- Traffic congestion
- High costs of building and maintaining roads and parking facilities
- Traffic accidents
- Pollution emissions
- High costs to consumers of owning and operating costs, and paying transit fares
- Inadequate mobility for non-drivers
- Excessive energy consumption and associated economic costs and environmental damages
- Inadequate physical fitness and resulting health problems

Planning objectives (or *benefits*) describe desirable outcomes. These are the inverse of problems. For example, if traffic congestion is a problem then congestion reduction is a planning objective, and if traffic accidents are a problem then improved traffic safety is a planning objective. This describes what a community wants to achieve.

Conventional transport planning tends to focus on certain planning objectives and overlook others, particularly in formal economic evaluation in which impacts are quantified and monetized (measured in monetary values), as summarized in Table 1.

[1] Economically excessive travel is vehicle-travel consumers would forego if transport policies better reflected market principles, so user benefits are smaller than total costs to society.

Table 1 **Comprehensive Planning Objectives** (Litman 2010)

Planning Objective	Definition	Consideration in Conventional Planning
Increased user convenience and comfort	More convenient and comfortable conditions for transport system users, such as better user information, nicer walking facilities and transit waiting areas, and less crowded transit vehicles.	Although often recognized as desirable, not generally quantified or included in benefit-cost analysis.
Congestion reduction	Reduced delays, and associated reductions in travel time, fuel costs and pollution emissions.	Motor vehicle congestion costs are widely recognized and quantified, but delays to non-motorized travel (called the "barrier effect" is generally ignored.
Roadway cost savings	Reduced costs for building and maintaining roadways.	Generally considered.
Parking cost savings	Reduced costs for building and maintaining parking facilities.	Generally ignored. For example, the parking cost savings that result when travel shifts from automobile to alternative modes is not generally considered when evaluating transport polices and projects.
Consumer cost savings	Reduced costs to users to own and operate vehicles, and for public transit fares.	Operating cost savings are generally recognized but vehicle ownership savings (such as if improved travel options allows households to reduce their vehicle ownership) are generally ignored.
Reduced traffic accidents	Reduced per capita traffic crashes and associated costs.	Crash risk, measured per vehicle-mile, is often considered, but impacts of changes in vehicle mileage are generally ignored.
Improved mobility options	Improved quantity and quality of transport options, particularly affordable modes that serve non-drivers.	Sometimes recognized as a planning objective but seldom quantified or included in formal economic evaluation.
Energy conservation	Reduced energy consumption, particularly petroleum products.	Sometimes recognized.
Pollution reduction	Reduced emissions of harmful air, noise and water pollution.	Sometimes recognized.
Physical fitness and health	Improved physical fitness and health, particularly more walking and cycling by otherwise sedentary people.	Not usually considered in the past, but is increasingly recognized, although seldom quantified.
Land use objectives	Support for various land use planning objectives (called "smart growth"), including more compact, mixed development (which improves accessibility and reduces public service costs), openspace preservation, and community redevelopment.	Sometimes recognized as a planning objective but seldom quantified or included in formal economic evaluation.

"Planning objectives" are desirable outcomes, the opposite of "problems." This table lists various transport planning objectives and the degree they are considered in conventional planning.

Many transport improvement strategies only help achieve a few planning objectives. For example, expanding highways increases motorist comfort and reduces traffic congestion.[2] More efficient and alternative fueled vehicles conserve energy and reduce pollution emissions.[3] By improving travel options and reducing total vehicle travel, Win-Win strategies tend to provide a much broader range of benefits, many of which are overlooked or undervalued by conventional transport planning, as indicated in Table 2.

Table 2 **Comparing Strategies** (Litman 2005)

Planning Objective	Roadway Expansion	Efficient and Alt. Fuel Vehicles	Win-Win Solutions
Impacts on Vehicle Travel	*Increased*	*Increased*	*Reduced*
Increase user convenience and comfort	✓		✓
Congestion reduction	✓		✓
Roadway cost savings			✓
Parking cost savings			✓
Consumer cost savings		?	✓
Reduced traffic accidents			✓
Improved mobility options			✓
Energy conservation		✓	✓
Pollution reduction		✓	✓
Physical fitness and health			✓
Land use objectives			✓

(✓ = Achieve objectives.) Roadway expansion and more fuel efficient vehicles provide few benefits. Win-Win Solutions improve travel options and encourage more efficient travel patterns, which helps achieve many planning objectives.

Win-win benefits become more evident if long-term travel impacts are considered. For example, over the long-run, roadway expansion often induces additional vehicle travel, which reduces congestion reduction benefits and increases total traffic problems including downstream congestion (for example, expanding highways often increases surface street congestion), road and parking facility costs, accidents, energy consumption, pollution emissions and sprawl.

Similarly, more fuel-efficient vehicles tend to reduce energy consumption, pollution emissions and fuel cost (although these savings are often offset by increased vehicle purchase costs). However, because they cost less to drive, owners of fuel efficient vehicles tend to drive more annual miles, which can increase traffic problems including road and parking facility costs, accidents, and sprawl.

[2] Congestion reductions tend to reduce energy consumption and pollution emissions per vehicle-mile, but these are included in most monetized estimates of congestion reduction benefits, and some congestion reduction strategies induce additional vehicle travel which offsets some of these savings.
[3] More efficient and alternative fuel vehicles reduce vehicle operating costs, but generally increase ownership costs, so consumer cost impacts are uncertain.

Win-Win strategies can help achieve multiple planning objectives. Improving transport options (walking, cycling, ridesharing, public transit, etc.) tends to directly benefit the people who use these modes, and by reducing total vehicle travel this benefits other residents by reducing their congestion, accident risk and pollution exposure. Pricing reforms can also provide many benefits: they increase some costs but reduce others. For example, road tolls and parking fees increase the costs of driving but reduce the taxes and the portion of rents that would otherwise be needed to finance roads and parking facilities. In addition, by giving more travelers incentive to use alternative modes, pricing reforms tend to improve transport options, for example, by encouraging middle-income residents to support pedestrian, cycling and public transit service improvements, and by making use of these modes more socially acceptable. Smart growth development policies reduce the distances people must travel to access services and activities, which provides direct and indirect benefits. When all impacts are considered, these Win-Win strategies are often the most cost effective and beneficial solutions to transport problems.

Table 3 **Comparing Strategies Including Travel Impacts**

Planning Objective	Roadway Expansion	Fuel Efficient Vehicles	Transport Options	Price Reforms	Smart Growth
Motor Vehicle Travel Impacts	*Increased*	*Increased*	*Reduced*	*Reduced*	*Reduced*
User convenience and comfort	✓		✓		✓
Congestion reduction	✓/✗[4]	✗	✓	✓	✓
Roadway cost savings	✗	✗	✓	✓	✓
Parking cost savings	✗	✗	✓	✓	✓
Consumer savings	✓	✗/✓[5]	✓	✗/✓[6]	✓
Reduced traffic accidents	✗	✗	✓	✓	✓
Improved mobility options	✗		✓	✗/✓[7]	✓
Energy conservation	✗	✓	✓	✓	✓
Pollution reduction	✗	✓	✓	✓	✓
Physical fitness and health			✓	✓	✓
Land use objectives	✗	✗	✓	✓	✓

(✓ = Achieve objectives. ✗ = Contradicts objective.) Roadway expansion and more fuel efficient vehicles provide few benefits, and by increasing total vehicle travel they can exacerbate other problems such as congestion, accidents and sprawl. Win-Win Solutions improve travel options, encourage use of alternative modes and create more accessible communities, which reduces total vehicle travel and increases economic efficiency. This helps achieve many planning objectives.

[4] Congestion is reduced on the expanded facility but often increases downstream, such as on surface streets.
[5] More fuel efficient vehicles tend to have higher purchase costs but lower operating costs.
[6] User fees increases driving costs but reduce general taxes used to finance roads and parking facilities.
[7] Higher fuel, road and parking prices make driving less affordable, but distance-based pricing and lower public transit fares make travel more affordable, and by encouraging use of alternative modes, pricing reforms tend to improve the quality of alternatives, such as improved walking and cycling conditions, improved public transit services, and increasing the social status of alternative modes.

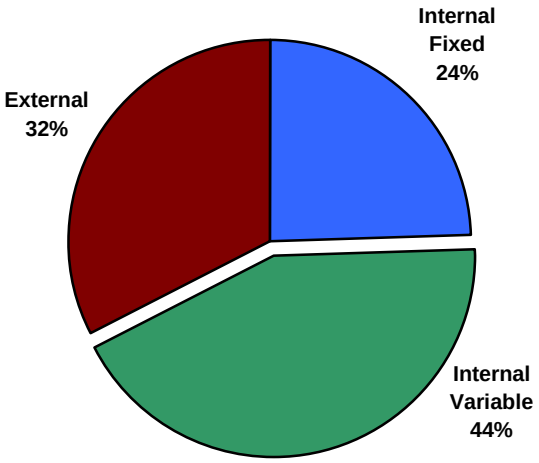
How Win-Win Solutions Work

These are, admittedly, big claims. To understand why such large benefits are possible it is useful to consider some basic market principles ("Market Principles," VTPI 2007). Efficient markets have certain requirements, including viable consumer options, cost-based pricing, and economic neutrality. Transport markets often violate these principles.[8]

For example, although consumers have many options when purchasing a vehicle, they often have few alternative mobility options. This results, in part, from planning biases that favor automobile travel over other modes. For example, many jurisdictions have dedicated funds for roads and parking facilities that cannot be used for other types of transportation improvements, even if they are more cost effective. This encourages decision-makers to choose automobile-oriented solutions to transportation problems, even when alternatives are better overall.

Other market distortions involve underpricing (Vermeulen, et al. 2004; Litman 2004; Parry, Walls and Harrington 2007). Current user fees fail to reflect marginal costs as required for an efficient market. Although motor vehicles are expensive to own, they are relatively cheap to drive, costing just a few cents per mile in direct expenses. Depreciation, insurance, registration and residential parking costs are largely *fixed*, not directly affected by how much a vehicle is driven. This encourages motorists to maximize their vehicle travel to get their money's worth from such expenditures. Other costs are *external*, not borne directly by users, including subsidized parking, roads funded through general taxes, and congestion, accident risk and pollution costs imposed on others. Less than half the costs of driving are efficiently priced, as indicated in Figure 1.

Figure 1 **Automobile Cost Distribution** ("Transportation Costs," VTPI 2007)

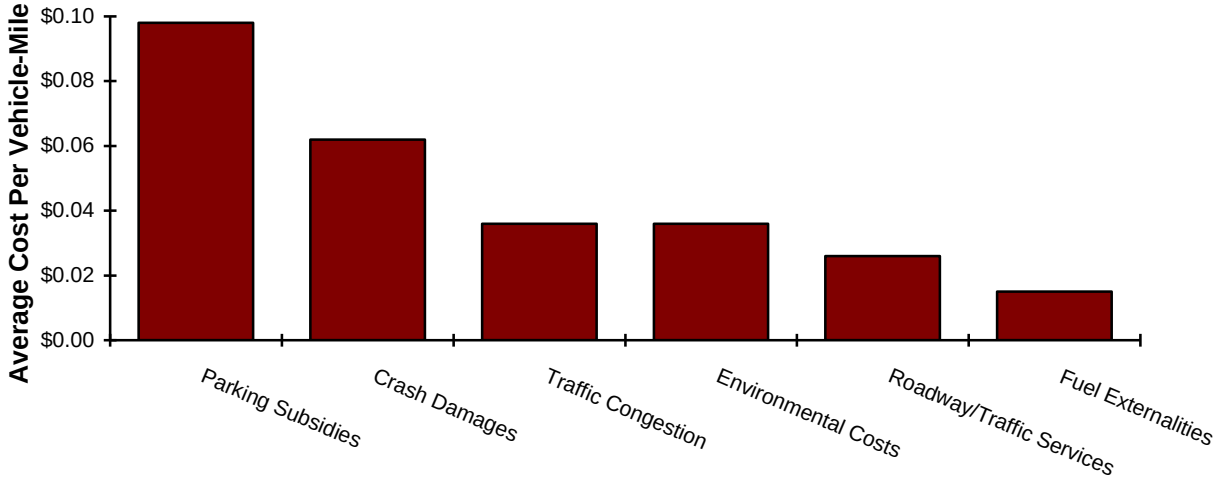


Automobile travel is underpriced. More than half of automobile costs are external or fixed.

[8] In this case, *transport markets* include anything that affects the type and amount of travel consumed, including the supply, price and management of transportation facilities and services, and land use policies that affect the location of destinations.

Figure 2 illustrates estimated automobile travel external costs. There are several of these costs. As a result, a strategy that reduces one cost but increases others may be harmful overall. For example, strategy that reduces congestion by 10% but increases crash, parking and environmental costs by 5% each is probably not worthwhile, but a congestion reduction strategy that also reduces crashes, parking and environmental costs by even a small amount is worth much more than one that only reduces congestion.

Figure 2 **Annual Costs of Automobile Use** ("Transportation Costs," VTPI, 2007)



This figure illustrates estimated per-mile costs of motor vehicle ownership and use.

Put differently, current pricing fails to reward consumers for the savings that result when they drive less. For example, shifting from driving to alternative modes or closer destinations reduces congestion, parking, crash and pollution costs, but these savings are not returned to the individuals who make the change. Consumers therefore lack the incentive to choose the most cost effective option, as illustrated in Figure 3. This is inefficient and unfair, because people who drive less than average are forced to subsidize the costs of others who drive more than average, and since vehicle travel tends to increase with income, market distortions favoring automobile travel tend to be regressive.

Figure 3 **Efficient Markets Return Savings To Individuals Who Reduce Mileage**

Motorist Reduces Mileage (walks, bikes, rides transit, closer destination, etc.) ⇩ **Reduced Costs** (road wear, parking, accidents, etc.) ⇩ **Savings Are Widely Distributed** (reduced taxes, reduced business costs, etc.)	**Motorist Reduces Mileage** (walk, bike, ride transit, closer destination, etc.) ⇩ **Reduced Costs** (road wear, parking, accidents, etc.) ⇩ **Savings Returned To The Individual That Reduced Mileage**
In current markets, savings that result when motorists reduce mileage are widely distributed through the economy.	*In efficient markets, savings that result when motorists reduce mileage are passed back to that individual.*

Win-Win strategies correct such distortions, as described in Table 4. Win-Win strategies are a type of preventive medicine, equivalent to putting the transportation system on a healthier diet. This can avert more difficult and expensive measures that would otherwise be required to address transport problems.

Table 4 **Win-Win strategies Support Market Principles** (Litman 2005)

Market Requirements	Current Market Distortions	Win-Win Solutions
Options. Consumers need viable transport and location options, and information about those options.	Consumers often lack viable alternatives to automobile transport, and living in automobile dependent communities.	Many Win-Win strategies increase travel options directly, and all increase options indirectly by stimulating demand for alternatives.
Cost-based pricing. Prices for each good should reflect its production costs.	Motor vehicle travel is significantly underpriced: many costs are either fixed or external.	Many Win-Win strategies result in more efficient pricing.
Economic neutrality. Public policies (laws, taxes, investments, etc.) should not arbitrarily favor one activity or group.	Many laws, tax, planning and funding practices favor automobile travel over alternatives.	Many Win-Win strategies help correct biases that favor automobile transport over modes and goods.
Land Use. Land use policies should not favor automobile oriented development.	Many current land use policies encourage lower-density, automobile-dependent land use patterns.	Some Win-Win strategies correct land use biases that encourage sprawl and automobile dependency.

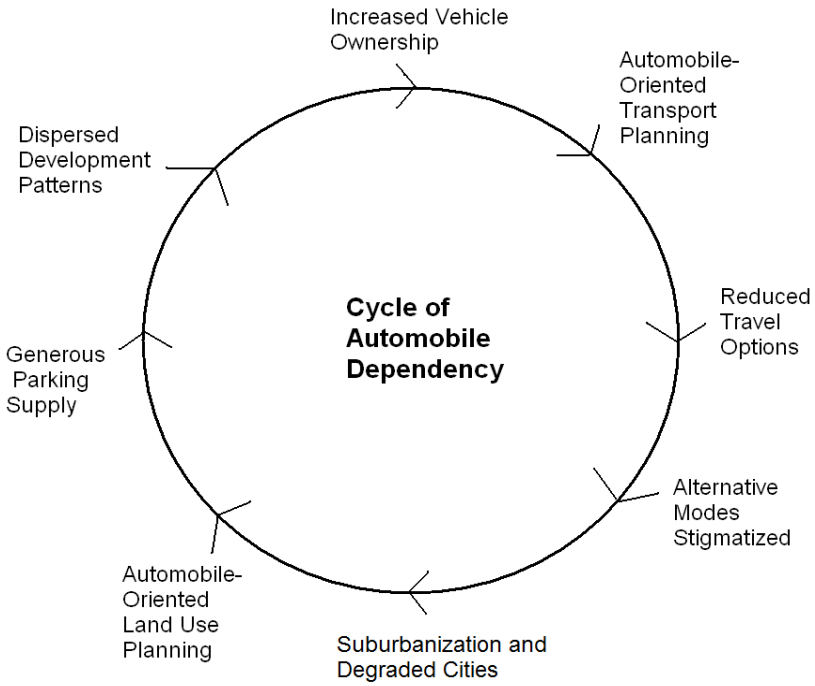
Win-Win strategies correct market distortions, creating a more efficient and equitable transport system.

These market distortions create *economic traps* (also called a *tragedy of the commons*), in which competition for resources creates conflicts between individual interests and the common good, making society worse off overall. Although individual market distortions may seem modest and justified, their effects are cumulative and synergistic (total impacts are greater than the sum of individual impacts), significantly increasing transport problems and costs. These distortions skew countless travel decisions in ways that increase motor vehicle travel beyond what is optimal.

These distortions have many impacts so analyzing them individually underestimates their total harm, and potential benefits of reforms. For example, underpriced parking not only increases parking problems, it also exacerbates congestion, roadway, crash and pollution costs. Similarly, underpricing road use increases not only congestion and roadway costs, but also parking, crash and pollution problems. In addition to their short-term impacts these distortions contribute to a long-term cycle of automobile dependency (Figure 4).

These distortions are well entrenched. Reforms face skepticism and obstacles; they are often greeted with “why me,” “why now” and “why bother.” Yet, many transport problems are virtually unsolvable without such reforms. For example, urban traffic congestion is unlikely to decline significantly without a combination of improved travel options and pricing reforms (Goodwin, 1997). When people vote against transport market reforms they are voting in favor of problems such as traffic congestion.

Figure 4 **Cycle of Automobile Dependency**



Various market distortions reinforce the cycle of automobile dependency, leading to economically-excessive automobile ownership and use.

Many of these distortions are legacies of past constraints and objectives. For example, until recently it was difficult to charge efficiently for roads and parking facility use, but new pricing methods are more cost effective and convenient. Similarly, in the past underpriced driving may have been justified to take advantage of economies of scale in vehicle and roadway production; but such policies are not justified in a mature transport system. In other words, the justification for Win-Win strategies increases with improved technology and diminishing marginal benefit from vehicle travel.

This is not to suggest that driving should be prohibited or that it provides no benefits. This analysis simply indicates that in a more optimal market consumers would choose to drive less and be better off as a result. As an analogy, food is essential for life and therefore provides tremendous benefits. However, this does not mean that everybody should increase their food consumption or that society should subsidize all food. At the margin (relative to current consumption) many people are better off eating less. Food subsidies may sometimes be justified, but it would be economically and medically harmful to subsidize all food for everybody. Similarly, that mobility provides benefits does not prove that *more* driving is better, that current levels of driving are optimal, or that driving should be subsidized. Many motorists would prefer to drive less, provided that the alternatives are convenient, comfortable and affordable.

Win-Win Strategies

This section describes specific Win-Win strategies. For more information see appropriate chapters in the "Online TDM Encyclopedia (VTPI, 2007) and other referenced documents.

Least Cost Transportation Planning

Least-cost transportation planning is a term for more comprehensive and neutral planning that:

- Considers all significant impacts (costs and benefits), including indirect effects.
- Considers demand management equally with facility capacity solutions.

For example, least cost planning means that funding for roads and parking facilities could be used to improve alternative modes or support mobility management programs if they are more cost effective at achieving transportation planning objectives, such as providing mobility and reducing congestion, considering all benefits and costs.

Conventional transport planning practices tend to favor automobile travel and undervalue alternative modes in various, sometimes subtle ways (Sussman, 2001; Beimborn and Puentes, 2003; Litman, 2006b; "Comprehensive Transport Planning," VTPI, 2007). There is often significant funding dedicated to roads and parking facilities that cannot be shifted to other modes, and funding dedicated to capital projects that cannot be used for management programs. This encourages decision-makers to expand roads and parking facilities even when alternative options are more cost effective overall.

Conventional transportation evaluation practices rely primarily on indicators of motor vehicle travel quality, such as roadway level-of-service ratings and average traffic speed, but ignore impacts on other modes. As a result, these planning practices favor roadway capacity expansion even if it degrades walking and cycling conditions (and therefore transit access, since most transit trips involve walking links), and leads to more dispersed, automobile-dependent land use patterns. These practices favor mobility over accessibility and automobile travel over other modes.

Implementation

Least-cost planning is generally implemented by transport planning organizations, but can also be applied by businesses, for example, when evaluating solutions to parking problems. A related strategy is to require individual transportation plans to support VMT reduction and pollution emission reduction objectives (Steinberg, 2007).

Travel Impacts

Least-cost planning can affect virtually all types of travel. Its impacts vary depending on circumstances, and often take many years to be fully realized, but often results in 10-20% reductions in automobile travel compared with what would otherwise occur.

Mobility Management Programs

Mobility management (also called *Transportation Demand Management* or *TDM*) programs provide services that encourage more efficient travel behavior, including rideshare matching, transit improvements, bicycle and pedestrian facility improvements, parking management, and promotion of alternative modes ("TDM Programs," VTPI, 2007). *Transportation Management Associations* are private, non-profit, member-controlled organizations that provide such services in a particular area, such as a commercial district or industrial park.

Implementation

TDM programs and TMAs are generally implemented by government agencies (transportation or environmental) and by business associations.

Travel Impacts

TDM programs and TMAs impacts vary depending on circumstances. They are most common in urban areas. Comprehensive programs often reduce automobile travel 10-20% compared with what would otherwise occur.

Commute Trip Reduction Programs

Commute Trip Reduction (CTR) programs encourage employees to use efficient commute options. CTR programs typically include some of the following strategies:

- Commuter Financial Incentives (described below).
- Alternative scheduling (flextime and compressed work weeks).
- Telework (allowing employees to work from home or at a neighborhood work center).
- Rideshare matching.
- Marketing and promotion activities.
- Guaranteed Ride Home.
- Company travel policy reforms, such as allowing reimbursement for bicycle or transit mileage for business trips when these modes are cost effective.

Implementation

Commute Trip Reduction programs are generally implemented by individual businesses, transportation management associations or government agencies.

Travel Impacts

Commute Trip Reduction programs affect the 20% of travel that consists of commuting. Programs typically reduce automobile commuting 5-15% if they lack financial incentives (described next), and twice that if they do include financial incentives. In urban areas they tend to shift travel to walking and public transit. In suburban and rural areas they tend to shift travel to cycling and ridesharing. Shifts to teleworking depend on the type of work rather than geographic location.

Commuter Financial Incentives

Commuter Financial Incentives include several types of incentives that encourage alternative commute modes:

- *Parking Cash Out* means that commuters who are offered subsidized parking are also offered the cash equivalent if they use alternative travel modes. For example, an employee may be able to choose between a free parking space if they drive to work, or $75 per month if they use an alternative mode.
- *Travel allowances* are a financial payment provided to employees instead of parking subsidies. Commuters can use this money to pay for parking or for another travel mode.
- *Transit and rideshare benefits* are free or discounted transit fares provided to employees.
- *Reduced employee parking subsidies* means that commuters who drive must pay some or all of their parking costs.
- *Company travel reimbursement policies* that reimburse bicycle or transit mileage for business trips when these modes are comparable in speed to driving, rather than only reimbursing automobile mileage.

These strategies are more efficient and equitable than the common practice by businesses of subsidizing parking but offering no comparable benefit to employees who use alternative modes.

Commuter financial incentives can be prorated according to how much employees use alternative modes. For example, employees who drive twice a week would receive 60% of the full Parking Cash Out allowance.

Implementation

Commuter Financial Incentives are usually implemented by businesses, sometimes with government encouragement. They are sometimes implemented as part of a parking management program, to reduce parking facility costs. Public policies can encourage their implementation, by reducing parking requirements if such incentives are offered (for example, zoning codes might require 100 parking spaces at a particular office if parking is free and no other incentives are offered to employees, but only 80 spaces if employees are offered parking cash out (an example of a Parking Management, described later).

Travel Impacts

Commuter Financial Incentives affect the 20% of travel that consists commuting. They typically reduce automobile commuting 10-30% compared with what would otherwise occur. Travel impacts vary depending on the magnitude of the financial incentive, the travel options available, and the type of employees.

Fuel Taxes - Tax Shifting

Since governments must tax something to raise revenue, many economists recommend shifting taxes from desirable activities to those that are harmful or risky, for example, reducing taxes on employment and commercial transactions, and increasing taxes on the consumption of polluting, non-renewable resources such as petroleum (CBO, 2006; Litman, 2008b). Current fuel taxes are relatively low, particularly in the U.S. and many developing countries. There are several specific justifications for increasing taxes on petroleum products in general and motor vehicle fuel in particular ("Fuel Tax Increase," VTPI, 2007; Wachs, 2003):

- To reflect inflation. Fuel taxes are generally unit based (cents per gallon or liter), as opposed to a percentage of the retail price, and so their real value declines with inflation. The real, inflation adjusted value of fuel taxes has declined significantly in many jurisdictions. Increasing taxes and indexing them to inflation is justified to maintain constant revenue.
- As a road user fee. Special fuel taxes are generally considered a road user fee, which should at least pay the costs of building and maintaining roadways, and perhaps more to recover other associated costs, such as traffic services. In many jurisdictions fuel taxes are too low to finance roadway costs, so increases are justified.
- To encourage energy conservation in order to reduce dependence on imported resources, increase economic efficiency, reduce pollution emissions (including climate change emissions) and to leave more petroleum for future generations (Litman, 2007c).
- To internalize petroleum production subsidies, external costs and tax exemptions.

Implementation

Fuel tax increases are generally implemented by state/provincial and federal governments, although some areas have local fuel taxes. Such increases should be predictable and gradual (such as a 10% annual fuel tax increase over several years) to minimize transition costs. Optimal fuel taxes are at least high enough to cover a fair share of all public costs for providing roadway and producing and importing petroleum, and could be higher to achieve other social objectives, such as reducing pollution emissions. This would increase fuel taxes by 40-100%. Virtually any fuel tax increase can be justified as a tax shift, provided revenues substitute for other taxes, although total increases may be limited by fuel tax rates in nearby jurisdictions.

Travel Impacts

The elasticity of vehicle travel with respect to fuel price tends to be –0.1 to -0.3, and the elasticity of fuel consumption with respect to fuel price is –0.3 to –0.7 (in the longer term motorists can respond to higher fuel prices by purchasing more fuel efficient vehicles). Gradually increasing fuel taxes so prices increase by 40-100% would reduce automobile travel 5-15% compared with what would otherwise occur, and reduce fuel consumption by 25-65%. It affects virtually all types of motor vehicle travel.

Pay-As-You-Drive Pricing

Pay-As-You-Drive (PAYD) pricing (also called *Distance-Based* and *Mileage-Based pricing*) means that vehicle insurance or other fees are based directly on how much it the vehicle is driven ("Pay-As-You-Drive Pricing," VTPI, 2007). This can be done by changing the pricing unit (i.e., how fees are calculated) from the vehicle-year to the vehicle-mile, vehicle-kilometer or vehicle-minute. Existing pricing factors are incorporated so higher-risk motorists pay more per unit than lower-risk drivers. For example, a $375 annual insurance premium becomes 3¢ per mile, and a $1,250 annual premium becomes 10¢ per mile. An average U.S. motorist would pay about 7¢ per mile for PAYD insurance. Similarly, currently fixed vehicle taxes, registration, licensing and lease fees, and taxes can be converted to distance-based fees by dividing existing fees by average annual mileage for each vehicle class. For example, if a vehicle's annual registration fees are $300 and its class averages 12,000 annual miles, the distance-based fee is 2.5¢ per mile.

Pay-As-You-Drive pricing requires annual odometer audits, which means that a service station, vehicle emission inspection station or insurance broker checks the vehicle's speedometer for signs of tampering and records the odometer reading. Such audits typically require 5 to 10 minutes, and less if performed with other vehicle servicing (tune ups, emission inspections, etc.), with an incremental cost of $5 to $10. Once the system is established, there is virtually no incremental cost to pricing any fee based on mileage.

Pay-As-You-Drive pricing helps achieve several public policy goals including fairness, affordability, road safety, consumer savings and choice, and reduced traffic problems such as traffic congestion, road and parking facility costs, pollution emissions and sprawl. PAYD should reduce average annual mileage of affected vehicles by 10-15%, reduce crash rates by a greater amount, increase equity, and save consumers money. It reduces the need for cross-subsidies currently required to provide "affordable" unlimited-mileage coverage to high-risk drivers. It can particularly benefit lower-income communities that currently pay excessive premiums. Some insurance companies now offer versions of PAYD pricing, but implementation is limited.

Implementation

PAYD insurance could be a consumer option, in which case only a small portion of total vehicle travel would be affected (10-30% depending on program design), or it could be mandatory, in which case it would affect virtually all private vehicles. PAYD insurance is implemented by insurance companies, which can be encouraged or mandated by state/provincial policies and incentives. PAYD registration is implemented by state or provincial governments.

Travel Impacts

Pay-As-You-Drive insurance can apply to virtually all private automobile travel, and PAYD registration fees and taxes could apply to all vehicles. PAYD pricing typically reduces affected vehicles' average annual mileage 10-15%, depending on how fees are structured.

Road Pricing

Road Pricing means that motorists pay directly for driving on a particular roadway or in a particular area ("Road Pricing," VTPI, 2007). *Congestion Pricing* (also called *Value Pricing*) refers to road pricing with variable fees designed to reduce traffic congestion. Transportation economists have long advocated road pricing as a way to fund transportation improvements and to reduce congestion problems. Road tolls are justified since many road and bridge projects would otherwise be funded trough general taxes, or by taxes paid by motorists who seldom or never use costly new facilities. Some roads include both priced and unpriced lanes, allowing motorists to choose between financial and timesavings. Experience with road tolls and various types of congestion pricing indicate that motorists respond to such fees, shifting travel time, route, destination and mode, increasing overall transportation system efficiency.

Implementation

Road pricing is generally implemented by regional or state/provincial governments, sometimes through public-private partnerships. It can be used to finance new highways and bridges, to finance transportation programs, and as a demand management strategy.

Travel Impacts

Road pricing typically reduces 10-20% of affected vehicle travel (travel on roads with road pricing fees). Although only a small portion of total vehicle travel occurs on new highways or under urban-peak conditions, the prime candidates for road pricing, this travel imposes relatively high parking, pollution and congestion costs (since these costs are highest in urban areas), so total benefits are relatively large. For example, road pricing imposed on the 10% of vehicle travel that consists of urban-peak highway traffic might reduce total vehicle mileage by just 1-2%, but reduce parking and pollution costs by 5-10% and congestion costs by 10-30%.

Parking Management

Parking Management includes a variety of strategies that encourage more efficient use of existing parking facilities, as summarized in the table below.

Table 5 **Parking Management Strategies** ("Parking Management," VTPI, 2007)

Strategy	Description	Typical Reduction	Traffic Reduction
Shared Parking	Parking spaces serve multiple users and destinations.	10-30%	
Parking Regulations	Regulations to prioritize use of the most desirable parking spaces.	10-30%	
More Accurate and Flexible Standards	Adjust parking standards to more accurately reflect demand in a particular situation.	10-30%	
Parking Maximums	Establish maximum parking standards.	10-30%	
Remote Parking	Provide off-site or urban fringe parking facilities.	10-30%	
Smart Growth	Encourage more compact, mixed, multi-modal development to allow more parking sharing and use of alternative modes.	10-30%	✓
Walking and Cycling Improvements	Improve walking and cycling conditions to expand the range of destinations serviced by a parking facility.	5-15%	✓
Mobility Management	Use resources that would otherwise be devoted to parking facilities to encourage use of alternative modes.	10-30%	✓
Parking Pricing	Charge motorists directly and efficiently for using parking facilities.	10-30%	✓
Improve Pricing Methods	Use better charging techniques to make pricing more convenient and cost effective.	Varies	
Financial Incentives	Provide financial incentives to shift mode, such as parking cash out.	10-30%	✓
Unbundle Parking	Rent or sell parking facilities separately from building space.	10-30%	✓
Parking Tax Reform	Change tax policies to support parking management objectives.	5-15%	✓
Bicycle Facilities	Provide bicycle storage and changing facilities.	5-15%	✓
Improve User Information	Provide convenient and accurate information on parking availability and price.	5-15%	✓
Improve Enforcement	Insure that parking enforcement is efficient, considerate and fair.	Varies	
Overflow Parking	Establish plans to manage occasional peak parking demands.	Varies	
Address Spillover Problems	Use management, enforcement and pricing to address spillover problems.	Varies	

This table summarizes various parking management strategies.

Implementation

Parking management is generally implemented by property owners and local governments, often with local or regional government support and encouragement.

Travel Impacts

Many parking management strategies reduce vehicle travel directly, and all support more compact, multi-modal development. Parking management programs typically reduce vehicle trips 5-15% if financial incentives (such as pricing) are excluded, and 10-30% if included.

Transit Service Improvements

There are many ways to improve public transit services, and encourage transit use, including increased service area and frequency, increased transit speed and reliability (including use of transit priority systems that allow transit vehicles to bypass congestion), reduced crowding, more comfortable vehicles, nicer waiting areas (stations and stops), reduced and more convenient fares, improved rider information and marketing programs, transit oriented land use development, pedestrian and cycling improvements around transit stops, bike and transit integration (bike racks on buses, bicycle parking at stations, etc.), park-and-ride facilities, improved security for transit users and pedestrians, and transit services targeting particular needs such as express commuter buses and special event services ("Transit Improvements," VTPI, 2007). Marketing programs that raise the social status of transit travel can also be considered a type of service improvement.

Implementation

Transit service improvements are generally implemented by local, regional and state/provincial governments, often with federal support. Transit improvements may require new funding sources. Some improvements (such as transit lanes) require support by other government agencies.

Travel Impacts

Transit improvements primarily affect urban travel. They have both direct and indirect travel impacts. Direct impacts reflect the passenger-miles shifted from driving to these modes. Indirect impacts reflect the effects that transit and rideshare improvements can have on per capita vehicle ownership and land use patterns, which affects both commute and non-commute travel (Litman, 2006a). Residents of communities with good transit services tend to drive 10-20% less than in more automobile-oriented areas.

Ridesharing

Ridesharing refers to carpooling and vanpooling, in which vehicles carry multiple passengers. *Carpooling* uses participants' own automobiles, while *vanpools* use a larger vehicle that is often leased for the purpose. Ridesharing has minimal incremental costs because it makes use of vehicle seats that would otherwise be unoccupied.

Implementation

Rideshare programs can be implemented by an individual employer, by a Transportation Management Association, a transit agency, or a regional transportation agency.

Travel Impacts

Ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they include incentives such as HOV priority and commuter financial incentives.

HOV Priority

HOV Priority refers to strategies that give *High Occupant Vehicles* (buses, vanpools and carpools) priority over general traffic ("HOV Priority," VTPI, 2007). HOV priority measures can be justified as a more efficient and equitable allocation of road space (travelers who share a vehicle and therefore *impose* less congestion on other road users, are rewarded by *bearing* less congestion delay), an efficient use of road capacity (they can carry more people than a general use lane), and as an incentive to shift to more efficient modes. HOV Priority strategies include:

- HOV highway and arterial lanes.
- High Occupancy Toll (HOT) lanes (HOV lanes that allow lower occupancy vehicles that pay a toll.
- Busways (special lanes for transit buses with features to improve transit service quality).
- Queue-jumping lanes and intersection controls that give priority to HOVs.
- Preferred parking spaces or parking fee discounts provided to rideshare vehicles.

Implementation

HOV Priority can attract more peak-period travelers to transit and ridesharing. Implementation can be based on their cost effectiveness at achieving conventional planning objectives, and often more to achieve other, more difficult to quantify objectives. It is generally implemented by regional and state/provincial governments, often with federal support.

Travel Impacts

HOV priority primarily affects travel on major roadways under urban-peak conditions which represents a relatively small portion of total travel (typically 5-10%), but provides proportionally larger reductions in congestion and parking costs. A major HOV priority program that provides substantial time savings to high occupant vehicles typically shifts 10-20% of automobile trips to transit and ridesharing, and so typically reduces 0.5% to 2% of automobile miles.

Walking and Cycling Improvements

Walking and cycling travel can substitute for some motor vehicle trips directly, and supports other alternative modes such as public transit and ridesharing. Residents of communities with good walking and cycling conditions drive less and use transit and rideshare more. There are many specific ways to improve nonmotorized transportation (Walking and Cycling Improvements," VTPI, 2004):

- Improve sidewalks, crosswalks, paths and bikelanes.
- Increase road and path connectivity, with special shortcuts for nonmotorized modes.
- Pedestrian oriented land use and building design.
- Traffic calming, speed reductions and vehicle restrictions, to reduce conflicts between motorized and nonmotorized traffic.
- Safety education, law enforcement and encouragement programs.
- Convenient and secure bicycle parking.
- Address security concerns of pedestrians and cyclists.

Implementation

Walking and cycling improvements are generally implemented by local and regional governments. They can be justified based on their cost effectiveness at achieving conventional planning objectives (congestion reduction and parking cost savings), and often more to achieve other objectives (such as equity, basic mobility for non-drivers, improved public health, livable communities, tourism development), or to correct decades of automobile-oriented planning practices.

Travel Impacts

Walking and cycling improvements primarily affect short-distance trips (less than three miles) but can influence longer trips by supporting public transit travel. Also, a short walking or cycling trip often replaces a longer automobile trip, for example, when improved walking conditions convince people to shop locally rather than driving to a more distant store. People who live in more walkable and bikeable communities typically drive 10-20% less than they would in more automobile-oriented communities, but some of this reflects self-selection (people who prefer nonmotorized travel choose more walkable communities). Comprehensive nonmotorized improvement programs can probably reduce per capita vehicle travel by 1-4%, and more in conjunction with other Win-Win strategies.

Smart Growth Land Use Policies

Current land use policies limit development density, disperse destinations and favor automobile access over alternative modes. *Smart growth* policies, such as those described below, reduce vehicle travel and provide other benefits ("Smart Growth," VTPI, 2007).

- Encourage compact development with diverse housing types (single and multi-family).
- Create more complete, self-contained communities. For example, locating schools, parks and shops within neighborhoods.
- Encourage infill development, such as redevelopment of older buildings and neighborhoods.
- Concentrate commercial activities in compact centers or districts. Use access management to prevent arterial strip commercial development.
- Use development fees and utility pricing that reflects the higher costs of providing public services at lower-density sites.
- Develop a dense network of interconnected street. Keep streets as narrow as possible, particularly in residential areas and commercial centers.
- Design streets to accommodate walking and cycling. Create a maximum number of connections for non-motorized travel, such as trails that link dead-end streets.
- Apply parking management and reduce parking requirements.

Implementation

Smart growth policies are implemented by developers, and governments.

Travel Impacts

Comprehensive Smart Growth programs can reduce resident and employee vehicle travel by 10-30%, or even more, compared with automobile-oriented development.

Location Efficient Development

Location Efficient Development refers to building, neighborhood and community development that reflects Smart Growth principles. *Location Efficient Mortgages* recognize the savings that result in credit assessments, giving homebuyers more incentive to choose efficient locations.

Implementation

Location efficient development is generally implemented by developers, lenders, and local and regional governments. *Location Efficient Mortgages* are implemented by banks and other lending institutions.

Travel Impacts

Location efficient development tends to reduce residents' vehicle travel by 10-30%. Similarly, employees working at location efficient businesses tend to reduce their automobile commute trips by 10-30%.

Mobility Management Marketing

Mobility Management Marketing involves various activities to improve consumers' knowledge and acceptance of alternative modes, and to provide products that better meet travelers' needs and preferences ("Mobility Management Marketing," VTPI, 2007). Given adequate resources, marketing programs can significantly increase use of alternative modes and reduce automobile travel.

Implementation

Mobility management marketing be justified based on their effectiveness at achieving conventional transport planning objectives, such as congestion reduction, and even more to achieve additional, more difficult to quantify objectives such as improved mobility options for non-drivers and community livability. It is generally implemented by local and regional governments, and by public transit agencies.

Travel Impacts

Mobility management marketing tends to affect local personal travel. Effective marketing programs can significantly increase use of alternative modes, and typically reduce automobile travel by 5-10% (Cairns, et al., 2004).

Freight Transport Management

Freight Transport Management includes various strategies of increasing the efficiency of freight and commercial transport ("Freight Transport Management, VTPI, 2007). This can include improving distribution practices so fewer vehicle trips are needed, shifting freight to more resource efficient modes (such as from air and truck to rail and marine), improving efficient modes such as marine, rail and bicycle, better siting of industrial locations to improve distribution efficiency, improving vehicle operation and implementing fleet management to reduce impacts such as noise and air pollution, and by reducing the total volume of goods that need to be transported. Because freight vehicles tend to be large, energy-intensive and high polluting, a relatively small improvement in freight efficiency can provide significant benefits.

Implementation

Freight transport management is generally implemented by local and regional governments. It be justified based on its effectiveness at achieving conventional transport planning objectives, such as congestion reduction, and even more to achieve additional, more difficult to quantify objectives such as improved productivity.

Travel Impacts

Although commercial vehicles represent less than 10% of total traffic, they tend to be heavy vehicles that impose large impacts. Reductions of 5-15% of freight vehicle travel can be achieved.

School and Campus Trip Management

These programs help overcome barriers to the use of alternative modes, and provide positive incentives for reduced driving to schools and college or university campuses ("School Transport Management," VTPI, 2007). School trip management usually involves improving pedestrian and cycling access, promoting ridesharing, and encouraging parents to use alternatives when possible. Campus trip management programs often include discounted transit fares, rideshare promotion, improved pedestrian and cycling facilities, and increased parking fees. These programs give students, parents and staff more travel choices, encourage exercise, and reduce parking and congestion problems.

Implementation

School transport management is generally implemented by schools and local governments.

Travel Impacts

School and campus transport management affects 5-10% of trips involving travel to schools. Such programs typically reduce automobile travel by 5-15%, reducing 0.25-1.5% of total automobile trips.

Regulatory Reforms

Many jurisdictions limit transportation service competition. Private bus and jitney services are often prohibited or restricted to favor existing service providers. Taxi regulations often restrict the number of taxi vehicles that can operate and the services they can provide. Many of these regulations are outdated or unnecessarily restrictive. Although there are reasons to regulate transportation services to maintain quality, predictability and safety, unnecessary regulations can be changed to address specific problems while encouraging competition, innovation and diversity ("Regulatory Reform," VTPI, 2007). Specific reforms include allowing sharing of taxi travel, and creating legal frameworks for new transportation services, such as subscription commuter bus services.

Implementation

Regulatory reforms are generally implemented by local, regional and state/provincial governments.

Travel Impacts

Regulatory reforms affect various types of travel. Impacts vary depending on circumstances and can take many years to be fully realized. Their impacts are generally small, but may be significant in specific circumstances.

Carsharing

Carsharing provides affordable, short-term (hourly and daily rate) motor vehicle rentals in residential areas as an alternative to private ownership ("Carsharing," VTPI, 2007). Because it has lower fixed costs and higher variable costs than private vehicle ownership, carsharing tends to significantly reduce annual vehicle mileage by participants.

Implementation

Carsharing is generally implemented by private companies or non-profit organizations, often with local or regional government support. It can be justified based on its effectiveness at achieving conventional transport planning objectives, such as congestion reduction and parking cost savings, and even more to achieve additional, more difficult to quantify objectives such as improved mobility for non-drivers.

Travel Impacts

Carsharing services are usually located in urban areas where there are suitable travel options so a significant portion of residents do not need own an automobile. In a typical region 20-40% of residents live in neighborhoods suitable for carsharing, and perhaps 2-5% of those residents would carshare rather than own a private vehicle ownership if the service were available. People who shift from owning a private vehicle to carsharing are typically lower-annual-mileage drivers who reduce their vehicle travel about 50% (i.e., they reduce their mileage from 6,000 to 3,000 annual miles). This suggests that carsharing services can reduce total vehicle travel by 0.1% to 0.6%.

Traffic Calming and Traffic Management

Traffic calming includes various strategies to reduce traffic speeds and volumes on specific roads ("Traffic Calming," VTPI, 2007). Typical strategies include traffic circles at intersections, sidewalk bulbs that reduce intersection crossing distances, raised crosswalks, and partial street closures to discourage short-cut traffic through residential neighborhoods. This increases road safety and community livability, creates a more pedestrian- and bicycle-friendly environment, and can reduce automobile use.

Implementation

Traffic calming can be justified based on its safety benefits, to improve mobility for non-drivers, and to increase community livability and property values. It is generally implemented by local governments.

Travel Impacts

Traffic calming primarily affects local street travel, and can provide modest reductions in affected travel by improving the relative convenience, speed and safety of walking and cycling. In a typical community perhaps 3-6% of total travel may take place on roads suitable for traffic calming, and perhaps 3-6% of mileage on those roads is reduced, resulting in 0.1% to 0.4% total reductions in vehicle mileage.

Summary of Win-Win Strategies

Table 6 summarizes these various Win-Win strategies.

Table 6 **Win-Win Strategies**

Name	Description	Transport Impacts
Least-Cost Planning	More comprehensive and neutral planning and investment practices.	Increases investment and support for alternative modes and mobility management, improving transport options.
Mobility Management Programs	Local and regional programs that support and courage use of alternative modes.	Increases use of alternative modes.
Commute Trip Reduction (CTR)	Programs by employers to encourage alternative commute options.	Reduces automobile commute travel.
Commuter Financial Incentives	Offers commuters financial incentives for using alternative modes.	Encourages use of alternative commute modes.
Fuel Taxes - Tax Shifting	Increases fuel taxes and other vehicle taxes.	Reduces vehicle fuel consumption and mileage.
Pay-As-You-Drive Pricing	Converts fixed vehicle charges into mileage-based fees.	Reduces vehicle mileage.
Road Pricing	Charges users directly for road use, with rates that reflect costs imposed.	Reduces vehicle mileage, particularly under congested conditions.
Parking Management	Various strategies that result in more efficient use of parking facilities.	Reduces parking demand and facility costs, and encourages use of alternative modes.
Parking Pricing	Charges users directly for parking facility use, often with variable rates.	Reduces parking demand and facility costs, and encourages use of alternative modes.
Transit and Rideshare Improvements	Improves transit and rideshare services.	Increases transit use, vanpooling and carpooling.
HOV Priority	Improves transit and rideshare speed and convenience.	Increases transit and rideshare use, particularly in congested conditions.
Walking and Cycling Improvements	Improves walking and cycling conditions.	Encourages use of nonmotorized modes, and supports transit and smart growth.
Smart Growth Policies	More accessible, multi-modal land use development patterns.	Reduces automobile use and trip distances, and increases use of alternative modes.
Location Efficient Housing and Mortgages	Encourage businesses and households to choose more accessible locations.	Reduces automobile use and trip distances, and increases use of alternative modes.
Mobility Management Marketing	Improved information and encouragement for transport options.	Encourages shifts to alternative modes.
Freight Transport Management	Encourage businesses to use more efficient transportation options.	Reduces truck transport.
School and Campus Trip Management	Encourage parents and students to use alternative modes for school commutes.	Reduces driving and increases use of alternative modes by parents and children.
Regulatory Reforms	Reduced barriers to transportation and land use innovations.	Improves travel options.
Carsharing	Vehicle rental services that substitute for private automobile ownership.	Reduces automobile ownership and use.
Traffic Calming and Traffic Management	Roadway designs that reduce vehicle traffic volumes and speeds.	Reduces driving, improved walking and cycling conditions.

There are various Win-Win strategies, which encourage more efficient transportation.

Virtually all of these strategies have been successfully implemented somewhere (CCAP, 2005; ICLEI, 2005; VTPI, 2007), although virtually no community has implemented all Win-Win strategies that are economically justified. Although exact impacts are difficult to predict, a comprehensive Win-Win program that includes all cost effective strategies would probably have significant impacts, as indicated in Table 7.

Table 7 **Win-Win Travel Impacts** (*Win-Win Evaluation Spreadsheet*, www.vtpi.org/win-win.xls)

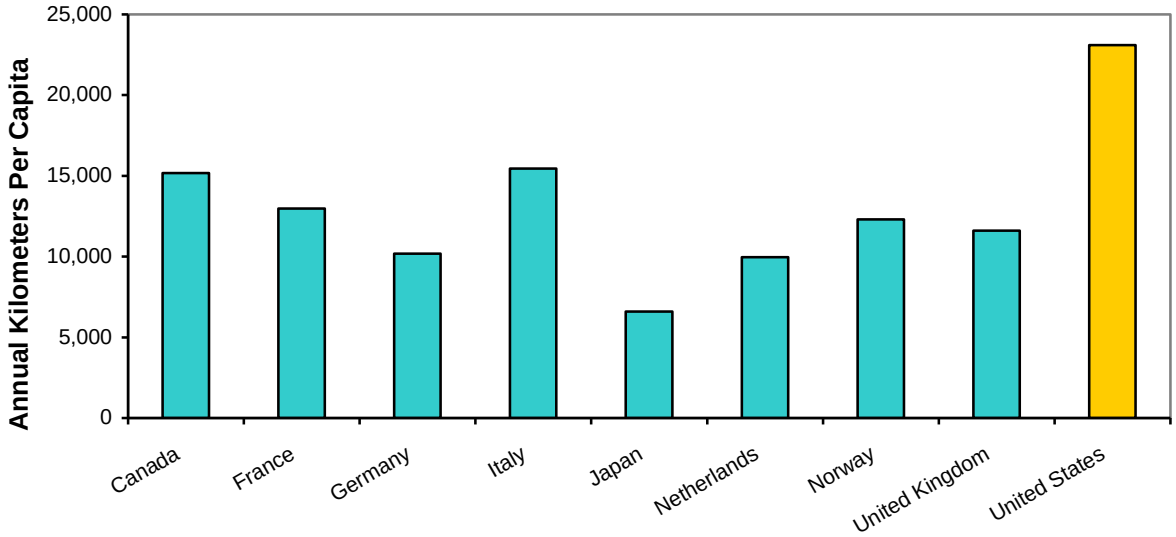
Name	Directly Affects Travel?	Portion of Vehicle Travel Affected	Typical Reductions By Affected Travel	Total Reductions
Planning Reforms	No	100%	10-20%	10-20%
MM Programs	No	30-50%. Mainly urban travel.	10-20%	4-8%
Commute Trip Reduction (CTR)	Yes	15-20%. Urban commute travel.	5-15%	1-3%
Commuter Financial Incentives	Partly (includes parking pricing)	15-20%. Urban commute travel.	10-30%	1-6%
Fuel Taxes - Tax Shifting	Yes	100%	5-15%	5-15%
Pay-As-You-Drive Pricing	Yes	80-90%. Private automobile travel.	10-15%	7-13%
Road Pricing	Yes	5-15%. Driving on new or congested roadways.	10-20%	1-3%
Parking Management	Yes	40-50%.	5-10%	2-8%
Parking Pricing	Yes	40-50%.	10-20%	3-10%
Transit and Rideshare Improvements	Yes	20-40%. Mainly urban travel.	10-20%	2-12%
HOV Priority	Yes	5-10%. Congested roadways.	10-20%	1-2%
Walking and Cycling Improvements	Yes	10-20%. Shorter-distance trips.	10-20%	1-4%
Smart Growth Reforms	Yes	30-50%. Mainly urban travel.	10-30%	3-15%
Location Efficient Housing and Mortgages	No (Is a Smart Growth Reform)	10-20%. Travel by households that change location.	10-30%	1-6%
Mobility Management Marketing	Yes	30-50%. Mainly urban travel.	5-10%	2-5%
Freight Transport Management	Yes	5-15%. Freight and commercial travel.	5-15%	0.3-2%
School and Campus Trip Management	Partly (is a type of CTR program)	5-10%. School and campus trips.	5-15%	0.3-1.5%
Regulatory Reforms	No	10-20%	5-10%	0.1-1.0%
Carsharing	Yes	1-2%. Households that can choose this option.	20-30%	0.2-0.6%
Traffic Calming	Yes	3-6%. Local urban travel.	3-6%	0.1-0.4%

This table indicates the magnitude of vehicle travel reductions caused by Win-Win strategies, assuming they are implemented to the degree economically justified. The "Directly Affects Travel" column indicates to whether a strategy affects travel itself or helps implement other Win-Win strategies that do, and so whether or not it should be counted toward cumulative effects.

This analysis suggests that a well-coordinated program of Win-Win strategies implemented to the degree economically justified would probably reduce total vehicle travel 30-50% compared with current planning and pricing practices (Litman, 2007b).

This estimate can be validated by comparing annual vehicle mileage in various wealthy countries (Figure 5). Countries with more diverse transportation systems and higher fuel taxes have 30-40% lower per capita vehicle mileage than in the U.S., although they have not widely implement some Win-Win strategies such as Pay-As-You-Drive fees and congestion pricing, indicating potential for additional, cost-effective vehicle travel reductions.

Figure 5 **Per Capita Motor Vehicle Travel, 2004** (OECD, 2004)



Per capita vehicle travel is 30-40% lower in wealthy countries that have Win-Win type policies.

Evaluation Guidelines

This section discusses some factors to consider when evaluating Win-Win benefits. For more information see "Guide to Calculating Mobility Management Benefits" (Litman, 2007a).

How Much

Some Win-Win strategies are clearly justified by market principles. Most economists support cost-based pricing and more neutral transportation policies and planning practices. For example, Pay-As-You-Drive vehicle insurance is justified to the degree that crash rates increase with vehicle mileage, and increased investment in alternative modes is certainly justified if they are the most cost effectiveness way to achieve conventional transport planning objectives (traffic and parking congestion reduction, increased safety), and possibly higher to achieve other, more difficult to quantify objectives, such as increased equity and improved public health.

There is legitimate debate as to the optimal level to which some strategies should be implemented, such as the magnitude of fuel taxes, transit investments and Smart Growth policies. However, as long as market distortions favoring automobile travel and sprawl exist, policies that support alternative modes, discourage driving, and encourage more accessible land use are justified on second-best grounds.

Estimating Total Impacts

Travel reduction impacts depend on the type of travel affected. For example, since commuting represents about 20% of all travel, an incentive that reduces automobile commuting by 15% reduces total vehicle travel about 3% (0.20 x 0.15) if implanted at every worksite, or about 1% if one-third of employees are affected.

Some strategies do not affect travel directly but support strategies that do. For example, Transportation Management Associations (TMAs) provide an institutional framework for implementing strategies such as Commute Trip Reduction programs and Parking Cash Out. While it would be true to say that a TMA can reduce vehicle traffic by 10-30% compared with not having such an organization, it would be incorrect to add the demand reductions of the TMA to the impacts of the individual strategies it helps implement.

Special care is needed when evaluating the impacts of multiple Win-Win strategies. Total impacts are multiplicative not additive. For example, if one strategy reduces traffic by 15% and another reduces traffic by 20%, together they would cause a 32% total traffic reduction, since the 20% reduction applies to a base that is already reduced 15% (calculated as 85% x 80%), not the 35% calculated by adding 15% and 25%.

Many combinations of Win-Win strategies have synergistic effects (total impacts are greater than the sum of their individual impacts), and so become more effective if implemented together. For example, parking pricing and transit service improvements may each reduce parking requirements just 10% if implemented alone, but 25% if implemented together because they are complementary.

Benefits

Many Win-Win strategies reduce relatively costly vehicle travel and so provide relatively large benefits. For example, commute trip reduction programs, congestion pricing and HOV priority primarily reduce urban, peak-period automobile traffic and so provide relatively large reductions in congestion, parking and pollution costs. Similarly, freight transport management reduces heavy vehicle travel, and so also provide relatively large congestion, road and accident cost reductions. Pay-As-You-Drive vehicle insurance tends to reduce relatively high-risk vehicle miles, and so provides large safety benefits.

Win-Win strategies tend to provide both *mobility* and *efficiency* benefits (Litman, 2006a). Mobility benefits result when improved transport options allow disadvantaged people to travel more, for example, if improved walking and transit service allow non-drivers better access to education and employment. Efficiency benefits result when incentives cause travelers to shift to a more efficient mode, for example, if HOV priority causes commuters to shift from driving alone to ridesharing or using public transit. Both types of benefits should be considered when evaluating Win-Win strategies. This can be confusing, however, because they are measured in different ways: mobility benefits are indicated by *increased accessibility by disadvantaged people*, while efficiency benefits are indicated by *reductions in total motor vehicle travel*.

Consumer Impacts

Some people are skeptical that Win-Win strategies are overall beneficial since they cause consumers to reduce their vehicle travel. But many strategies benefit consumers directly, by improving travel options or providing positive incentives such as cash rewards for using alternative modes, so consumers only reduce their driving when they consider themselves better off. Motorists who continue driving are no worse off, and benefit from reduced congestion, accident risk and pollution. If people change travel behavior in response to positive incentives (such as improved walking conditions or transit services) or financial rewards (such as parking cash out), they must be better off overall, or they would not change. Consumer surplus analysis can be used to determine net user impacts from price changes and financial incentives (Litman 2001).

Strategies that involve negative incentives, such as parking pricing, road pricing and fuel taxes can benefit consumers indirectly by providing revenues that offset other consumer costs and taxes; by reducing traffic congestion, accident risk and exposure to pollution emissions by motorists; and by reducing the need for motorists to chauffeur non-driving friends and family members.

Win-Win strategies tend to increase equity. For example, with current "free" parking, everybody pays for parking indirectly, through higher taxes, rents and retail prices, but some people benefit little, and so overpay their fair share. Parking Cash Out means that non-drivers receive employee benefits comparable in value to the parking subsidies given motorists. Virtually all Win-Win strategies increase travel options for people who cannot drive due to physical or economical constraints.

Economic Impacts

Economic Development refers to progress toward a community's economic goals, including increases in economic productivity, employment, business activity and investment (Litman 2011). Many people assume that since motor vehicle ownership and use tend to increase with income, motor vehicle travel must support economic development and reforms that reduce vehicle travel must be economically harmful. Transport planning decisions are sometimes portrayed as a tradeoff between the economic development benefits of increased mobility, and social and environmental benefits from reduced demand. But, Win-Win strategies support economic development overall by increasing transport system efficiency and providing economic savings.

For example, road and parking pricing reduces congestion and facility costs, and least cost planning increase the economic return on transportation investments. Total economic benefits can be large. Market reforms can provide hundreds of dollars in annual economic savings and productivity gains per capita. This can increase investment and competitiveness, support economic development and make consumers wealthier.

Vehicle and fuel cost savings benefit the economy overall. Expenditures on automobiles, fuel and roadway facilities provide relatively little regional economic activity because they are capital intensive and a significant portion of value is imported. Transport policies that reduce vehicle ownership and use, and therefore the amount that consumers spend on vehicles and fuel, tend to increase regional employment and productivity (Cortright 2007).

Although a basic highway system is important for economic development, once the system matures and the most cost effective projects have been implemented, further expansion provides much less benefit. For example, U.S. highway investments showed high annual economic returns during the 1950s and 1960s, but the rates of return declined by the 1980s, and these trends are likely to continue, since the most cost-effective investments have already been made (CBO 1998). This indicates that Win-Win strategies that result in more efficient use of existing transportation facilities, such as road and parking pricing, are overall better for the economy than further roadway expansion.

Conclusions

Win-Win solutions are cost-effective, technically feasible policy reforms and programs that help solve transport problems by improving transport options and correcting market distortions that result in economically excessive vehicle travel. They help create a more efficient and equitable transportation system which provides many economic, social and environmental benefits, and helps achieve various strategic planning objectives. Many transportation problems are virtually unsolvable without such reforms.

Individual Win-Win strategies tend to provide multiple but modest benefits, and many of their benefits are outside the traditional scope of conventional planning, which tends to focus on a limited set of impacts and objectives. As a result, Win-Win solutions tend to be undervalued. They are seldom considered the best way to solve any particular transport problem. However, their impacts are cumulative and synergistic. An integrated program of Win-Win strategies is often the most cost-effective way to improve transport overall.

Conventional planning generally considers demand management strategies as measures of last resort, to address specific problems such as congestion and air pollution, if no other solution is feasible. Win-Win planning takes the opposite approach – it applies transport market reforms whenever cost effective, taking into account all costs and benefits, and only implements capacity expansion as a last resort.

Win-Win strategies are the best way to create more sustainable transport systems that balance economic, social and environmental objectives. If fully implemented to the degree economically justified, Win-Win strategies would probably reduce motor vehicle travel by 30-50%, although exact impacts are difficult to predict and vary depending on geographic, demographic and economic conditions. They could meet Kyoto emission reduction targets while *increasing* consumer benefits and economic development.

Although few motorists want to give up driving altogether, at the margin, that is, compared with their current travel patterns, many people would probably prefer to drive less and rely more on alternatives, provided they are convenient, comfortable, safe and affordable. Win-Win strategies provide such options, making consumers better off overall. There are other successful examples of voluntary consumer behavior change, including reductions in smoking and increases in recycling and seat belt use. In each case, a combination of improved options, public education and incentives caused people to shift their behavior, indicating that many people want to change if given suitable support.

Because Win-Win strategies provide many different benefits, organizations and individuals representing a wide range of interests have reasons to support their implementation. This offers the opportunity for political coalitions to advocate for these reforms. Transportation professionals, local government and taxpayer groups, environmental organizations, economic development and business interests, social equity advocates, and even motorists all have reasons to support Win-Win solutions.

References and Information Resources

Asian Cobenefits Partnership (www.cobenefit.org) is a coalition that supports mainstreaming co-benefits into sectoral development plans, policies and projects in Asia.

Louise Bedsworth, Ellen Hanak and Jed Kolko (2011), *Driving Change: Reducing Vehicle Miles Traveled in California*, Public Policy Institute of California (www.ppic.org); at www.ppic.org/content/pubs/report/R_211LBR.pdf.

Edward Beimborn and Robert Puentes (2003), *Highways and Transit: Leveling the Playing Field in Federal Transportation Policy*, Brookings Institute (www.brookings.edu), 2003.

Sally Cairns, et al (2004), *Smarter Choices - Changing the Way We Travel*, UK Department for Transport (www.dft.gov.uk); at www.dft.gov.uk/pgr/sustainable/smarterchoices/ctwwt.

Carbon Tax Center (www.carbontax.org) provides information on carbon tax issues.

CBO (1998), *Economic Effects of Federal Spending on Infrastructure and Other Investments*, Congressional Budget Office (www.cbo.gov).

CBO (2006), *Evaluating The Role Of Prices And R&D In Reducing Carbon Dioxide Emissions*, Congressional Budget Office (www.cbo.gov).

CCAP (2005), *Transportation Emissions Guidebook*, Center for Clean Air Policy (www.ccap.org/trans.htm).

Charlotte Kendra G. Castillo, Deejay Cromwell Sanqui, May Ajero and Cornie Huizenga (2007), *The Co-Benefits of Responding to Climate Change: Status in Asia*, Work Assignment No. 417, Under the Perrin Quarles Associates (PQA), Co-benefits Coordinator in Asia Project (www.observatory.ph/co-benefits_asia/index.php).

Climate Works (2014), *Climate-Smart Development: Adding Up The Benefits Of Actions That Help Build Prosperity, End Poverty And Combat Climate Change*, Climate Works Foundation (www.climateworks.org) and World Bank (www.worldbank.org); at http://tinyurl.com/lgr75hl.

Joe Cortright (2007), *Portland's Green Dividend*, CEOs for Cities (www.ceosforcities.org); at www.ceosforcities.org/internal/files/PGD%20FINAL.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).

Lawrence Frank, Sarah Kavage and Todd Litman (2006), *Promoting Public Health Through Smart Growth: Building Healthier Communities Through Transportation And Land Use Policies*, Smart Growth BC (www.smartgrowth.bc.ca); available at www.smartgrowth.bc.ca/downloads/SGBC_Health%20Report%20Final.pdf.

Global Commission on Environment and Economy (2014), *Better Growth, Better Climate: The New Climate Economy Report*, Global Commission on the Economy and Climate (www.newclimateeconomy.net); at www.newclimateeconomy.report.

Phil Goodwin (1997), *Solving Congestion*, University College London (www.ucl.ac.uk/transport-studies/tsu/pbginau.htm).

ICLEI (2005), *Case Studies* and *Transport Project Summaries* International Council for Local Environmental Initiatives (www.iclei.org).

IGES (2011), *Mainstreaming Transport Co-Benefits Approach: A Guide To Evaluating Transport Projects*, Institute for Global Environmental Strategies (www.iges.or.jp); at www.iges.or.jp/en/cp/pdf/co-benefits/Transport%20Co-benefits%20Guidelines.pdf.

Todd Litman (1999), "Exploring the Paradigm Shifts Needed to Reconcile Transportation and Sustainability Objectives," *Transportation Research Record 1670*, Transportation Research Board (www.trb.org), 1999, pp. 8-12; at www.vtpi.org/reinvent.pdf.

Todd Litman (2003), "Measuring Transportation: Traffic, Mobility and Accessibility," *ITE Journal* (www.ite.org), Vol. 73, No. 10, October, pp. 28-32, available at www.vtpi.org/measure.pdf.

Todd Litman (2004), *Transportation Cost and Benefit Analysis*, VTPI (www.vtpi.org/tca).

Todd Litman (2005), "Efficient Vehicles Versus Efficient Transportation: Comparing Transportation Energy Conservation Strategies," *Transport Policy*, Volume 12, Issue 2, March 2005, Pages 121-129; at www.vtpi.org/cafe.pdf.

Todd Litman (2006a), *Evaluating Public Transit Benefits and Costs*, Victoria Transport Policy Institute (www.vtpi.org).

Todd Litman (2006b), "Transportation Market Distortions," *Berkeley Planning Journal*; issue theme *Sustainable Transport in the United States: From Rhetoric to Reality?* (www-dcrp.ced.berkeley.edu/bpj), Volume 19, 2006, pp. 19-36; at www.vtpi.org/distortions_BPJ.pdf.

Todd Litman (2006c), *Win-Win Transportation Emission Reduction Strategies*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/wwclimate.pdf.

Todd Litman (2006d), *Win-Win Impact Evaluation Spreadsheet*, Victoria Transport Policy Institute (www.vtpi.org/win-win.xls).

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

Todd Litman (2007b), *Socially Optimal Transport Prices and Markets*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/sotpm.pdf.

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

Todd Litman (2008a), *Appropriate Response To Rising Fuel Prices*, VTPI (www.vtpi.org); at www.vtpi.org/fuelprice.pdf.

Todd Litman (2008b), *Carbon Taxes: Evaluating Impacts, Benefits and Criticism*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/carbontax.pdf.

Todd Litman (2009), *Are Vehicle Travel Reduction Targets Justified? Evaluating Mobility Management Policy Objectives Such As Targets To Reduce VMT And Increase Use Of Alternative Modes*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/vmt_red.pdf.

Todd Litman (2010), *Comprehensive Transport Planning: Best Practices For Evaluating All Options And Impacts*, VTPI (www.vtpi.org); at www.vtpi.org/comprehensive.pdf.

Todd Litman (2011), *Evaluating Transportation Economic Development Impacts*, VTPI (www.vtpi.org); at www.vtpi.org/econ_dev.pdf.

G. F. Nemet, T. Holloway and P. Meier (2010) "Implications Of Incorporating Air-Quality Co-Benefits Into Climate Change Policymaking," *Environmental Research Letters* (http://iopscience.iop.org/1748-9326/5/1/014007); at http://iopscience.iop.org/1748-9326/5/1/014007/pdf/1748-9326_5_1_014007.pdf

OECD (2000), *Environmentally Sustainable Transport (EST) Best Practice Competition*, Organization for Economic Cooperation and Development (www1.oecd.org).

OECD (2004), *OECD Country Data Summary Spreadsheet*, OLISnet, Organization for Economic Cooperation and Development (www.oecd.org); at www.vtpi.org/OECD2004.xls.

OUM (Office of Urban Mobility) (2001), *TDM Success Stories*, Washington State Department of Transportation (www.wsdot.wa.gov/mobility/TDM/TDMsuccess.html).

Ian W. H. Parry, Margaret Walls and Winston Harrington (2007), *Automobile Externalities and Policies*, Discussion Paper 06-26, Resources for the Future (www.rff.org); at www.rff.org/rff/Documents/RFF-DP-06-26-REV.pdf.

Michael A. Replogle and Lewis M. Fulton (2014), *A Global High Shift Scenario: Impacts And Potential For More Public Transport, Walking, And Cycling With Lower Car Use*, Institute for Transportation and Development Policy (www.itdp.org); at www.itdp.org/wp-content/uploads/2014/09/A-Global-High-Shift-Scenario_WEB.pdf.

Robert Salter, Subash Dhar and Peter Newman (2011), *Technologies for Climate Change Mitigation: Transport Sector*, Risø Centre on Energy, Climate and Sustainable Development, United Nations Environmental Program (www.uneprisoe.org); at http://tech-action.org/Guidebooks/TNAhandbook_Transport.pdf.

SPECTRUM (2004), *Review of Specific Urban Transport Measures in Managing Capacity*, SPECTRUM (Study of Policies regarding Economic instruments Complementing Transport Regulation and the Undertaking of physical Measures) (www.its.leeds.ac.uk/projects/spectrum/downloads/D2.pdf).

Darrell Steinberg (2007), "SB 375 Connects Land Use and AB 32 Implementation," *The Planning Report* (www.planningreport.com); at www.planningreport.com/tpr/?module=displaystory&story_id=1257&format=html.

Joseph M. Sussman (2001), *Transportation Operations: An Organizational And Institutional Perspective, National Dialogue on Transportation Operations* (www.ops.fhwa.dot.gov/Speech%20Files/Sussman1.doc).

T&E (2006), *Less Oil, More Welfare*, European Federation for Transport and Environment (www.transportenvironment.org).

Scott Sharpe and Paul Tranter (2010), "The Hope For Oil Crisis: Children, Oil Vulnerability And (In)Dependent Mobility," *Australian Planner*, Vol. 47, No. 4, December, pp. 284-292; summary at http://dx.doi.org/10.1080/07293682.2010.526622.

USEPA (2002), *Transportation Control Measures Program Information Directory*, U.S. Environmental Protection Agency (http://yosemite.epa.gov/aa/tcmsitei.nsf). This searchable database describes approximately 120 programs that reduce transportation pollution.

USEPA, *Gateway to International Best Practices and Innovations* (www.epa.gov/innovation/international/transportation.htm), EPA National Center for Environmental Innovation

Vermeulen, et al (2004), *The Price of Transport: Overview of the Social Costs of Transport*, CE Delft (www.ce.nl).

VTPI (2007), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org).

Martin Wachs (2003), *Improving Efficiency and Equity in Transportation Finance*, Brookings Institute (www.brookings.edu), Center on Urban and Metropolitan Policy (www.brookings.edu/es/urban/publications/wachstransportation.htm).

WBCSD, *Sustainable Mobility Project*, World Business Council on Sustainable Development (www.wbcsdmobility.org/mobility_web/index.asp) describes 200 mobility case studies.

Lloyd Wright (2009), W*in-Win Solutions and Climate Change and Transport*, United Nations Centre for Regional Development (www.uncrd.org.jp); at www.uncrd.or.jp/env/4th-regional-est-forum/Presentations/01_PS1_Wright.pdf.

www.vtpi.org/winwin.pdf