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"Efficiency - Equity - Clarity"

Reinventing Transportation

Exploring the Paradigm Shift Needed
to Reconcile Transportation and Sustainability Objectives

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Abstract

A sustainable economy is sensitive to economic, social and environmental constraints. Sustainability requires more efficient, equitable, and environmentally sensitive transport. This cannot be achieved simply by improving the efficiency of vehicle designs or traffic management. It requires changes in the way we think about transportation, and how we identify and evaluate solutions to transport problems, "paradigm shifts." This paper discusses these changes and their implications for transportation decision making.

Sustainability requires rethinking how we measure transportation. Transport planners often treat vehicle movement as an end in itself. Sustainable transportation planning focuses on access, which can often be improved with strategies that reduce the need to travel altogether, such as land use management and improved communications. Sustainability requires comprehensive decision-making that takes into account indirect and interrelated impacts. Sustainable transport planning begins with a community's strategic plan, which individual transportation decisions must support. It requires policies that reward individuals, agencies and communities for achieving sustainability objectives.

There are many specific transportation strategies that can help support sustainability, including improved travel choices, more efficient pricing, and more efficient land use. Individually such strategies may have modest impacts, but implemented together they can provide substantial benefits. A third or more of current motor vehicle use could be reduced by eliminating market distortions that encourage inefficient travel.

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"*Problems cannot be solved at the same level of awareness that created them.*"
– Albert Einstein.

Why Change Paradigms?

Our transport system provides many benefits, but it also causes many problems. It serves non-drivers poorly. It distributes benefits and costs inequitably. It is financially burdensome to households, governments and businesses. It is increasingly inefficient due to traffic congestion and dispersed land use. It is a major cause of death and disability. It contradicts environmental and quality of life objectives. It relies on non-renewable resources that may become scarce in the future.

Our current approach to problem solving tends to fail when confronted with so many challenges. Conventional decision-making is reductionist; each problem is assigned to a different person or agency with narrow expertise and responsibilities. That approach tends to be ineffective at solving complex problems with interrelated and conflicting objectives. To identify truly optimal solutions transport planning must become more comprehensive, more sophisticated, and more integrated with other decision making institutions.

A paradigm refers to how people think about problems and develop solutions.[1] Famous paradigm shifts include Copernicus's heliocentric model of the universe, Darwin's theory of evolution, and liberal democracy as a social structure. The common management clichés, "Work smarter, not harder" and "Think outside the box" are admonitions to consider new approaches to problem solving, i.e., a paradigm shift. This paper explores the paradigm shifts needed to achieve more sustainable transport.

What is Sustainable Development?

There is growing interest in sustainable development. Hundreds of articles, reports and books have been published dealing with sustainability issues, and many communities are involved in sustainable planning projects.[2] Sustainable development can be defined as, "*…providing for a secure and satisfying material future for everyone, in a society that is equitable, caring, and attentive to basic human needs.*"[3]

Sustainability planning is to development what preventive medicine is to health: it anticipates and manages problems rather than waiting for crises to develop. Just as preventive medicine requires individuals to be informed and motivated to maintain healthy habits, sustainable development requires that individuals be involved in community decisions and be rewarded for socially beneficial behaviors.

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[1] Thomas Kuhn, *The Structure of Scientific Revolutions*, University of Chicago, 1970.
[2] Timothy Beatley, "The Many Meanings of Sustainability," *Journal of Planning Literature*, Vol. 9, No. 4, May 1995, pp. 339-342.
[3] William Rees, "Defining 'Sustainable Development'," *CHS Research Bulletin*, Centre for Human Settlements , University of British Columbia (www.interchg.ubc.ca/chs), May, 1989.

Sustainable economics is sensitive to environmental and social constraints, including indirect and long-term impacts.[4] It is concerned with intergenerational equity (insuring that people living in the future receive a fair share of existing resources) and long-term ecological viability. But it makes little sense to be concerned about future generations while ignoring current equity and ecological issues. Sustainability is therefore inherently concerned with equity and ecological health, both now and in the future.

Sustainable economics maintains a distinction between *growth* (increased quantity) and *development* (increased quality).[5] It focuses on social welfare outcomes rather than simply measuring material wealth, and questions common economic indicators such as Gross Domestic Product, which measure the quantity but not the quality of market activities. Unlike neoclassic economics, sustainable economics does not strive for ever increasing consumption, but rather for *sufficiency*.

Just as either under- and over-eating can be unhealthy, there is a socially optimal level of material consumption. Recognizing this is increasingly important as society becomes wealthier. Poor people usually benefit significantly from increased income, but marginal benefits decrease with affluence. For example, a household living on $10,000 annually can benefit significantly from an additional $5,000, which purchases better food, clothing and shelter. But a household that earns $100,000 annually may hardly notice another $5,000. If every household in a wealthy community receives an additional $5,000 there may be no net benefit as each household simply consumes more status goods.[6]

Not everybody accepts the limits implied by sustainable economics. Critics argue that human ingenuity mobilized through market incentives can overcome material constraints.[7] They conclude that resources may rationally be depleted provided that humanity is made better overall (i.e. increased industrial capital exceeds loss of natural capital). For example, depletion of wild fisheries is acceptable if fish can be raised efficiently in farms, or if equally satisfying food can be produced artificially. They assume that human ingenuity can develop substitutes for virtually any resource, including wood, petroleum and soil.

Advocates of sustainable development counter by pointing out major economic and cultural collapses caused by resource mismanagement. They recommend applying the "precautionary principal," which takes into account small but possible threats of catastrophe. Some sustainability advocates also challenge the anthropocentric (human centered) assumption that nature only has value if it directly benefits humans, arguing that biological diversity and ecological health have existence value in their own right.

[4] *A Survey of Ecological Economics*, Island Press (www.islandpress.org), 1995.
[5] Herman Daly, *Beyond Growth; Economics of Sustainable Development*, Beacon Press (Boston), 1996.
[6] Fred Hirsch, *Social Limits to Growth*, Harvard University Press (Cambridge), 1976.
[7] Julian Simon, *The Ultimate Resource*, Princeton University Press (Princeton), 1996.

What is Sustainable Transportation?[8]

Sustainability has significant implications for transportation planning, since transport activities tend to be highly resource intensive, have numerous external costs, and frequently distribute impacts inequitably. Sustainable transportation requires using each mode for what it does best, which typically means greater reliance on non-motorized for local travel, increased use of public transit in urban areas, a reduction (but not elimination) of personal automobile use.[9]

Sustainable planning challenges the assumption that increased vehicle travel reflects legitimate consumer demand, since consumers lack viable alternatives and markets are distorted in ways that underprice driving. While the first increment of motor vehicle travel (measured for example, as average per capita vehicle miles) may provide significant benefits to society, marginal benefits tend to decline with increased use. Doubling mileage does not double benefits for the simple reason that consumers select their most valuable trips first.

Sustainable planning focuses on outcomes, such as the quality of *access* (the ability to obtain desired goods, services, and activities[10]), rather than simply measuring quantity of mobility (such as travel speed or total mileage). Mobility is seldom an end in itself. Even recreational travel usually has a destination. Increased movement is not necessarily beneficial, it may indicate inefficiencies that require more travel to meet needs. John Whitelegg states,

> "It is the ease of access to other people and facilities that determines the success of a transportation system, rather than the means or speed of transport. It is relatively easy to increase the speed at which people move around, much harder to introduce changes that enable us to spend less time gaining access to the facilities that we need."[11]

Only by measuring transport in terms of access can options that reduce the need for travel (such as telecommuting and more efficient land use) be properly evaluated. The disciplines of geography and urban economics often measure access, but the analysis tends to be theoretical. The professions that implement transport policies – transport planners and traffic engineers – tend to measure vehicle movement, using indicators such as level of service (LOS), V/C ratios, congestion delay, and average vehicle speeds. These are inappropriate because:

- It is impossible build enough urban road and parking capacity to satisfy potential demand.
- Motor vehicles impose significant economic, environmental, and social costs.
- Some people cannot own or drive a motor vehicle.

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[8] *Sustainable Transport; Priorities for Policy Reform*, World Bank (Washington DC), 1996; *Toward a Sustainable Future*, Special Report 251, TRB (www.trb.org), 1997; *Towards Sustainable Transportation*, proceedings of OECD conference held March 1996 in Vancouver, BC.

[9] TAC, *Achieving Livable Communities*, Transportation Association of Canada (www.tac-atc.ca), 1998.

[10] *Mobility and Access; Transportation Statistics Annual Report 1997*, BTS (www.bts.gov); Elliot Sclar and K. Schaeffer, *Access For All*, Columbia University Press (NY), 1980.

[11] John Whitelegg, "Time Pollution," *The Ecologist*, Vol. 23, No. 4, July 1993, p. 131.

Changing Transportation Institutions

Sustainable transportation requires fundamental changes in our transportation planning practices. It demands more comprehensive analysis of impacts (including consideration of indirect and cumulative impacts)[12] and consideration of a broader range of solutions than usually occurs. It also requires that the public be involved in determining alternatives to be considered and evaluation criteria. Those are principles of good planning that are particularly necessary for sustainability planning.[13]

Sustainable transportation planning requires public involvement for two reasons. First, because sustainable development reflects a community's values, the public must be effectively involved at each stage of the planning process. Second, because sustainable transportation often involves changes in community design and residents' behavior, residents need to feel a stake in decisions if they are to be implemented effectively.

Sustainable development requires that individual transport decisions be subordinate to a community's long-term strategic objectives. Transport planners must recognize that their decisions can create self-fulfilling prophecies. For example, increasing highway capacity can stimulate automobile-dependent transport and land use patterns, while investments in transit, pedestrian and bicycle facilities can help create multi-modal transportation systems.[14] Transportation professionals have just as much reason to object to decisions that create automobile dependent land use patterns as they would to the closure of a highway lane or a reduction in transit service, since all result in reduced access.

Transportation planners and engineers receive professional rewards for implementing capacity expansion projects, but are seldom rewarded for finding ways to avoid the need for such projects. Demand management tends to involve skills such as education and marketing that are not traditionally valued in transportation agencies. Sustainable planning requires that transportation professionals shift from being traffic engineers concerned only with vehicle flow, into "public space architects" concerned with balancing diverse and often conflicting uses of road environments. Street are more than just conduits for vehicle traffic, they are part of the public realm, where people meet and interact. Roadway design must not focus on traffic movement objectives at the expense of non-moving and slow-moving uses of streetscapes.

Traffic engineers traditionally describe any increase in road or parking facility capacity as an "improvement," although from many perspectives (pedestrians, residents, aesthetics, environmental quality) it may represent degradation. Sustainable transport planning avoids language biased in favor of automobile travel, as described in the box below.

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[12] Louis Berger & Associates, *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects,* Report 403, Transportation Research Board (www.trb.org), 1998.
[13] Rick Cole, Trish Kelly and Judy Corbett, *The Ahwahnee Principles for Smart Economic Development,* Local Government Commission (www.lgc.org), 1998.
[14] Terry Moore and Paul Thorsnes, *The Transportation/Land Use Connection*, Report #448/449, Planning Advisory Service, American Planning Association (www.planning.org), 1994.

Developing Objective Transportation Language[15]

Many transportation planning terms are unintentionally biased toward motor vehicle travel. For example, projects that increase road or parking capacity are often called "improvements," although they may be harmful to many activities and people. Wider roads and larger parking facilities can degrade the local environment and reduce adjacent residential property values. Projects that increase vehicle traffic volumes and speeds can reduce the safety and mobility of pedestrians and cyclists. Calling such changes "improvements" indicates a bias in favor of one activity and group over others. Objective language uses more specific and neutral terms, such as "added capacity," "additional lanes," "modifications," or "changes."

The terms "traffic" and "trip" often refer only to motor vehicle travel. Short trips, non-motorized trips, travel by children, and non-commute trips are often undercounted or ignored in transport surveys, models, and analysis. Although most automobile and transit trips begin and end with a pedestrian or cycling link, they are usually classified simply as "auto" or "transit" trips.

The term "efficient" is frequently used to mean increased vehicle traffic speeds. This assumes that increasing motor vehicles speeds increases overall efficiency. This assumption is debatable. High vehicle speeds can reduce total traffic capacity, increase resource consumption, increase costs, and increase automobile dependency, reducing overall economic efficiency.

Level of service (LOS) is a qualitative measure describing operational conditions for a particular user group (motorists, cyclists, pedestrians, etc.). Transportation professionals often assume that, unless specified otherwise, level of service applies only to motor vehicles. It is important to indicate which users are considered when level of service values are reported.

Biased Terms	Objective Terms
Traffic	Motor vehicle traffic, pedestrian/bike traffic
Trips	Motor vehicle trips, person trips
Improve	Change, modify, expand, widen
Enhance	Change, increase traffic speeds
Deteriorate	Change, reduce traffic speeds
Upgrade	Change, expand, widen, replace
Efficient	Faster, increased vehicle capacity
Level of service	Level of service for…

Examples:

Biased: *Level of service* at this intersection is rated "D." The proposed *improvement* will cost $100,000. This *upgrade* will make our transportation system more *efficient* by *enhancing* capacity, preventing *deterioration* of *traffic* conditions.

Objective: *Level of service* at this intersection is rated "D" *for motorists* and "E" *for pedestrians*. A *right turn channel* would cost $100,000. This *road widening project* will *increase motor vehicle traffic speeds and capacity* but may *reduce safety and convenience to pedestrian travel*.

[15] Inspired by "Transportation Language Policy" memo by West Palm Beach, Florida City Manager Michael Wright sent to transportation staff, 14 November 1996.

No Regrets Options

There is significant uncertainty about some sustainability concerns. Long-term ecological impacts such as climate change, and social objectives such as improved community livability, are particularly difficult to quantify. It is therefore difficult to know how much economic growth society should trade off to reduce such risks or achieve such objectives. However, there are many "no regrets" strategies that provide economic, social and environmental benefits, and should therefore be implemented regardless of the value placed on social and environmental costs.

Current transportation markets are distorted in ways that result in excessive automobile travel.[16] Such distortions reflect outdated technologies and management practices. Because of these distortions, many of the costs of driving are either external, or internal but fixed, and driving is favored over other travel modes. This is economically inefficient, inequitable (since it results in households that drive less than average subsidizing those that drive more than average), and environmentally harmful.

For example, most employees are offered free parking, but no comparable benefit is offered those who use alternative modes. "Cashing out" free parking (i.e., giving employees who don't drive the cash equivalent of their parking subsidy) tends to reduce automobile commutes by 10-15%.[17] Similarly, current fixed vehicle insurance pricing is less equitable and less efficient than distance based pricing, and represents another market distortion that encourages additional driving over what would occur under more optimal pricing.[18] Given a less distorted market consumers would choose to drive less and be better off as a result. Any automobile travel foregone would represent low value trips that consumers give up in exchange for financial savings.

There are a number of technically feasible reforms that are cost effective in terms of conventional market costs (congestion reduction, road and parking facility cost savings, consumer savings, reduced accident damages, etc.), while also providing non-market social and environmental benefits. These are called "Win-Win" strategies because they provide a wide range of benefits.[19] Yet, because individually they have relatively modest impacts, they tend to be overlooked in conventional "reductionist" decision making.[20]

Some of these reforms consist of removing subsidies to automobile use. For example, zoning laws often require excessive parking supply, and tax laws often favor parking facilities over other land uses.[21] Other reforms involve revenue-neutral price shifts, which means that motorists who continue driving as much as they currently do would pay the

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[16] Todd Litman, *Socially Optimal Transport Prices and Markets*, VTPI (www.vtpi.org), 1998.

[17] Donald Shoup, Congress Okays Cash Out, *Access*, Vol. 13, (www.uctc.net), Fall 1998, pp. 2-8; Commuter Choice Program, USEPA (www.epa.gov/oms/traq); Philip Winters and Daniel Rudge, *Commute Alternatives Educational Outreach*, National Urban Transit Institute, Center for Urban Transportation Research, USF (Tampa; www.cutr.eng.usf.edu), 1995.

[18] Todd Litman, *Distance-Based Vehicle Insurance*, VTPI (www.vtpi.org), 1999.

[19] Todd Litman, *Win-Win Transportation Strategies*, VTPI (www.vtpi.org), 1999.

[20] Todd Litman, *Comparing Emission Reduction Strategies*, VTPI (www.vtpi.org), 1998.

[21] Todd Litman, *Pavement Busters Guide*, VTPI (www.vtpi.org), 1998.

same as they do now, on average, but they would have new opportunities to save money by reducing their mileage. Implementing such shifts at the state level are predicted to reduce driving by about 34% in Washington State.[22]

Least-cost transportation planning is another "no regrets" strategy.[23] Current transport planning often favors automobile facility investments over more efficient alternatives. For example, many state and federal funds are available only for roadway improvements. Zoning laws require expenditures on automobile parking facilities. Alternatives that encourage more efficient use of existing capacity typically cannot compete for these resources. As a result, investments are made in facilities to accommodate automobiles when other strategies that support sustainability objectives may be more cost effective.

Reforms to reduce such market distortions are justified for a variety of economic, social and environmental objectives. Many transportation problems, including congestion, increasing road and parking costs, excessive accident risk, and a lack of mobility for non-drivers, are virtually unavoidable over the long term until current market distortions that encourage excessive driving are addressed.[24]

Reducing distortions is increasingly important as the total amount of vehicle travel increases, so an increasing portion of travel is discretionary, with relatively small user benefit. This is the basic concept of a demand curve, which recognizes that some goods (in this case, trips) have more value to consumer than others, and consumers will choose the most valued goods (trips) first.

During the early years of motorization, increased vehicle use can provide significant benefits to society, but these decline with increased driving. For example, when per capita motor vehicle travel averages just 2,000 miles per year, this travel will consist of relatively high-value trips, such as emergency and medical services, freight deliveries, commuting and special trips. Doubling annual mileage to 4,000 miles per capita is likely to provide significant additional benefits. But if per capita vehicle travel averages already 12,000 miles per year, an additional 2,000 miles of travel will tend to offer much less benefit for the simple reason that consumers most valuable trips are already taken. At that point, additional driving will consist of travel that has relatively low value to consumers. Yet, 2,000 additional vehicle miles can have the same external costs whether the starting point is 2,000 or 12,000 miles per year. Thus, as communities become more automobile dependent it is particularly important to implement efficient pricing to insure that travel actually provides net benefits (benefits are greater than costs).

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[22] Todd Litman, Charles Komanoff and Douglas Howell, *Road Relief; Tax and Pricing Shifts for a Fairer, Cleaner, and Less Congested Transportation System in Washington State*, Energy Outreach Center (www.eoc.org), 1998.

[23] ECONorthwest, *Evaluation of Transportation Alternatives; Least-Cost Planning: Principles, Applications and Issues*, Metropolitan Planning Tech. Report #6, FHWA (www.fhwa.dot.gov), 1995.

[24] Phil Goodwin, *Solving Congestion*, Centre for Transport Studies, London (www.ucl.ac.uk/transport-studies/tsuhome.htm), 1997.

Example

Traffic volumes are increasing on a highway between a city and a suburb. Planners extrapolate the growth rate to predict extreme levels of future congestion. They evaluate two solutions: widen the highway or build a rail transit line, each of which could carry 3,000 peak-period commuters. The highway project is predicted to cost $250 million, while a rail option costs $300 million. The planners therefore conclude that the highway investment is most cost effective. However, such an analysis is incomplete and fails to identify the socially optimal option.

First, such predictions of traffic growth are fundamentally flawed. Most traffic models predict future traffic assuming minimal congestion and free roads and parking. This is equivalent to asking how much food a nice restaurant could give away. The results are self-fulfilling outcomes, as increased capacity encourages increased driving which creates "demand" for increased capacity. Travel demand should always be evaluated as a function instead of a point estimate. Rather than reporting, "Over the next decade traffic is predicted to increase 20%," transport planners should state, "Over the next decade traffic is predicted to grow 20% at current user costs, it will grow 10% if user costs increase by 25%, and there would be no growth if user costs increase by 50%." This allows evaluation of pricing strategies (parking charges, road tolls, distance-based insurance, etc.) to address traffic problems.

Traffic modeling often ignores the tendency of traffic congestion to maintain a self-limiting equilibrium. As roadways become more congested, motorists adjust by shifting their travel times and destinations, if capacity is expanded motorists take more peak period trips.[25] Modeling that fails to take this into account tends to overpredict future congestion, and overestimates the benefits of roadway capacity expansion.[26]

Second, the analysis focuses on agency financial costs, while ignoring other important impacts. For example, 3,000 automobile commuters require 3,000 parking spaces, a cost that is avoided if the trips are made by other modes. Additional automobile commuters increase surface street traffic, so there may be additional costs to deal with "downstream" congestion. The analysis assumed that each commuter has an automobile that will simply sit unused if they use public transit. Accident, pollution and sprawl costs are also ignored.

Third, the analysis is not based on a strategic community plan. Increasing highway capacity tends to make a community more automobile dependent and encourages low-density, automobile oriented land use. A major transit investment can provide a catalyst for developing a multi-modal transportation system and higher density, mixed-use development. A transit option may therefore be favored if it supports a community's strategic vision, even if it costs more from a narrow perspective.

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[25] Todd Litman, *Generated Traffic; Implications for Transport Planning*, VTPI (www.vtpi.org), 1998.
[26] Robert Johnston and Raju Ceerla, "The Effects of New High-Occupancy Vehicle Lanes on Travel and Emissions," *Transportation Research*, Vol. 30A, No. 1, 1996, pp. 35-50.

Table 1 **Conventional Vs. Sustainable Transportation Planning**

	Conventional Planning	**Sustainable Planning**
Transportation	Defines and measures transportation primarily in terms of vehicle travel.	Defines and measures transportation in terms of access.
Objectives	Maximize road and parking capacity to meet predicted traffic demand.	Uses economic analysis to determine optimal policies and investments.
Public Involvement	Modest to moderate public involvement. Public is invited to comment at specific points in the planning process.	Moderate to high public involvement. Public is involved at many points in the planning process.
Facility Costs	Considers costs to a specific agency or level of government.	Considers all facility costs, including costs to other levels of government and costs to businesses (such as parking).
User Costs	Considers user time, vehicle operating costs, and fares or tolls.	Considers user time, vehicle operating and ownership costs, fares and tolls.
External Costs	May consider local air pollution costs.	Considers local and global air pollution, down-stream congestion, uncompensated accident damages, impacts on other road users, and other identified impacts.
Equity	Considers a limited range of equity issues. Addresses equity primarily by subsidizing transit.	Considers a wide range of equity issues. Favors transportation policies that improve access for non-drivers and disadvantaged populations.
Travel Demand	Defines travel demand based on existing user costs.	Defines travel demand as a function, based on various levels of user costs.
Generated Traffic/ Induced Travel	Ignores altogether, or may incorporate limited feedback into modeling.	Takes generated traffic into account in modeling and economic evaluation of alternative policies and investments.
Integration With Strategic Planning	Considers community land use plans as an input to transportation modeling.	Individual transportation decisions are selected to support community's strategic vision. Transportation decisions are recognized as having land use impacts.
Investment Policy	Based on existing funding mechanisms that target money by mode.	Least-cost planning allows resources to be used for the most cost-effective solution.
Pricing	Road and parking facilities are free, or priced for cost recovery.	Road and parking facilities are priced for cost recovery and based on marginal costs to encourage economic efficiency.
Transportation Demand Management	Uses TDM only where increasing roadway or parking capacity is considered infeasible (i.e., large cities and central business districts).	Implements TDM wherever possible. Capacity expansion only occurs where TDM is not cost effective. Considers a wide range of TDM strategies.

Fourth, the analysis only considered a limited range of solutions. Transportation professionals often assume that the "normal" solution to congestion is to increase capacity. Transportation demand management (TDM) alternatives are only considered as a last resort, when capacity expansion is considered infeasible, and often, only a limited number of TDM strategies are evaluated. Sustainable transport planning reverses these priorities, applying TDM wherever economically justified, even if traffic congestion is not a significant problem. Capacity is only added when aggressive TDM cannot address problems. It considers a wide range of potential TDM strategies.

In this example, planners could consider a variety of TDM strategies, including commute trip reduction programs, parking management, improved bus service, rideshare programs, road pricing, and land use management policies. A package of strategies that increase travel choices, encourage alternatives to driving, and create more efficient land use is usually the economically and socially optimal solution to transport problems.

TDM strategies are often presented to the public in a negative way, with the implication that they involve personal sacrifice and are inequitable. Yet, TDM programs can benefit consumers overall, and increase equity. For example, parking cashout gives non-drivers benefits comparable to those currently provided only to drivers. Distance-based vehicle insurance makes insurance pricing more fair and affordable. Road and parking fee revenues can reduce general taxes or increase wages. With good design, transit and pedestrian oriented neighborhoods can provide a high quality of life while reducing automobile use.

The box below illustrates the difference between conventional and more comprehensive analysis.

Highway Vs. Transit Investments

Conventional Analysis	
Light Rail:	$300 million
Highway Expansion:	<u>$250 million</u>
Highway Option Net Benefits:	*$50 million*
Costs Not Considered:	
Parking (assuming 3,000 urban parking spaces with average cost of $10,000 each)	~$30 million
Surface street traffic congestion (assuming 3,000 additional vehicles traveling 10 mile per day, 300 days per year on surface streets during peak periods, with an average cost of $0.20 per mile, over 25 years with a 7% discount rate)	~$35 million
Vehicle Ownership Costs (assuming $500 average annual savings per transit user)	~$29 million
Highway Construction Traffic Delays	~$1 million
Generated Traffic (Reduces net benefits of highway project)	Probably substantial
Environmental & Social Benefits	<u>Probably substantial</u>
Transit Option Net Benefits	*$45 million+*

Conclusions

Sustainable development requires significant changes in our transportation system to increase economic efficiency, equity, and environmental security. This cannot be achieved simply by changing vehicle designs or improving traffic flow. It requires changing the way transportation professionals approach problems, and how individuals behave as citizens and consumers.

The bad news is that there are many barriers to these changes. For all its faults, our current transportation system provides a high degree of mobility to most users, particularly for the classes of people who are most influential in public decision making. Many industries benefit directly from our transportation system's inefficiencies. Most North Americans have had little experience with healthy communities that are not highly automobile dependent. As a result, there is resistance to change.

The good news, in terms of achieving more sustainable transportation, is that the marginal benefits of increased driving are diminishing. Most people have little desire to spend more time in their cars, drive further, or devote more resources to vehicles, roads and parking. Increasing roadway capacity is increasingly expensive. It is possible to justify significant progress toward more sustainable transportation based on conventional economic arguments and informed self-interest. Transportation professionals can contribute by becoming familiar with the full costs of transportation and alternative transport strategies. We can work to create institutions and policies that are less biased in favor of automobiles and urban sprawl. We can develop professional rewards for creating more efficient transportation systems.

Transportation professionals do not need to work for these changes alone. Other stakeholders – local officials, businesses, neighborhoods, public health advocates, social equity activists, and environmentalists – also have reasons to support sustainable transportation strategies. There are opportunities to develop coalitions to achieve sustainable transportation objectives.

Reframing the Transportation Question

If you ask people, *"Do you think that traffic congestion is a serious problem that deserves significant investment?"* most would probably answer yes. If you ask them, *"Would you rather invest in road capacity expansion, or use lifestyle changes such as increased urban density and more use of walking, bicycling, car pooling and public transit to solve congestion problems?"* a smaller majority would probably choose the road improvement option. These are essentially how choices are framed by conventional transportation plans.

But if you presented a more realistic description of choices by asking, *"Would you rather spend a lot of money increasing road capacity to achieve only moderate and temporary reductions in traffic congestion, and deal with increased personal, municipal, social and environmental costs from increased motor vehicle traffic, or would you rather create a more diverse transportation system to minimize such problems?"* the preference for road building would probably disappear.

References And Resources For More Information

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Centre for Alternative and Sustainable Transport (CAST) (www.staffs.ac.uk/schools/sciences/geography/cast/casthome.html).

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Letâ€™s imagine what a public transportation system for the future will look like: There will be a network of bus stops and transit stations strategically positioned connecting each neighborhood to the cityâ€™s business districts, hospitals and shopping centers. There will be a fleet of buses, light-rail, shuttles, driverless cars and bikes, all controlled by an intelligent management system. With a desire to reinvent transportation in the country, not-for-profit trust Hyperloop India, a multi-disciplinary think tank that originated in August 2015, backed by Invest India and incubated by MapmyIndia, is gearing up for the final lap of a prestigious event organised by Elon Muskâ€™s SpaceX. To explain in detail, The Hyperloop, which is a high-speed transportation system, is an ambitious and exciting idea proposed by inventor and tech guru Musk. Transportation at a crossroads. Where is our transportation system heading today? Recent events have put the United Statesâ€™ transportation system at a fundamental crossroads.Â Reinventing Transit. Local experts were utilized in every phase of the project including arborists and urban foresters, concrete specialists, traffic engineers, architects and landscapers. LTD also worked with New Flyer, a U.S. bus manufacturer with factories in St. Cloud and Crookston, Minnesota, to design a vehicle specifically for EmX. Understand how the ride sharing service Uber uses big data and data science to reinvent transportation and logistics globally.Â How Uber uses data science to reinvent transportation? Last Updated: 25 Jan 2021. With more than 8 million users, 1 billion Uber trips and 160,000+ people driving for Uber across 449 cities in 66 countries â€“ Uber is the fastest growing startup standing at the top of its game. Reinventing Road Transportation Systems. â€”Article by Stefan Groenendal for Enlivening Edgeâ€”. Can only organisations be reinvented, or can also complete social sectors be inspired by a next-stage in human consciousness? That intriguing question recently came up when George PÃ³r and I talked about writing on transportation systems for Enlivening Edge.