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## **Least Cost, Greatest Impact**

*A discussion paper on  
the applicability of  
Least Cost Planning  
to transport in Australia*

*Prepared by*

**Institute for Sustainable Futures**



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# **Least Cost, Greatest Impact**

*A discussion paper on the applicability of Least Cost Planning to transport in Australia*

Draft

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## Introduction

Least Cost Planning (LCP) is a methodology that considers the full effect of planning alternatives on different interests, including consumers, the community, business and industry, the environment, and government (Victoria Transport Policy Institute, 2003). It aims to evaluate a range of planning options, and to determine which options reduce total costs and maximize total benefits *across* those interests and has been applied widely in various utility sectors such as energy and water. In a transport context, LCP is able to enhance the efficiency, equity, transparency, and consistency of transport decision-making, providing relevant data that encourages the formulation of improved transport solutions.

### Discussion Paper Outline

The Institute for Sustainable Futures (ISF) suggests that LCP is an important tool that can be utilized to great effect by transport decision-makers in Australia. This discussion paper will explain the features of least cost planning and its application to transport systems. We will discuss the ways in which LCP enhances decision-making as well as examine a case study of the application of LCP to transport decision-making processes from the United States. We will conclude by suggesting further research questions that should be addressed on the path to the integration of LCP considerations into transport-decision making processes in future.

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## What is Least Cost Planning?

### Features of Least Cost Planning

LCP, also known as Integrated Resource Planning, is a methodology that calculates the total costs and benefits of transport alternatives, ranking alternatives according to least-cost to the community. In this case, "the community" refers to *all* stakeholders. LCP includes in its notion of costs and benefits not only directly measurable factors, such as public costs, but also intangibles that are traditionally considered more difficult to measure (Litman, 1997), such as health implications. LCP attempts to estimate the impact of each of these intangibles, and to rank them accordingly. This ranking then becomes important in weighting different options considered in the least cost process (DeCorla-Souza et al, 1999).

### Multi-modal options

A further implication of LCP for transport decision-making is that it considers the full variety of transport modes and considers them all equally. The inclusion of benefits such as improved health and reduced air pollution allows non-motorised transport like cycling and walking to be properly considered alongside the usual motorized modes (Mozer, 2002).

**Supply and demand side alternatives** In addition, not only does LCP consider the familiar transport infrastructure and system capacity options (supply-side options), it also has equal regard for demand-side options that attempt to address the source of transport need, and particularly transport demand management solutions (Greene and Wegener, 1997: 181-182). Demand management approaches are discussed in more detail below.

**Distinct from cost-benefit analysis** Whilst LCP was designed to evaluate the transport *system*, its principles are transferable to the consideration of different mixes of transport options. This means that individual options can be compared. It is distinct in this important respect from cost-benefit analysis (CBA), which is designed to analyse individual projects only. The two methods also differ in that CBA considers its primary measure of benefit to be the consumer surplus (Nelson and Shakow, 1997). Whilst consumer benefits are an aspect of LCP considerations, consumers are not the sole interest group considered when least cost options are determined.

**Cost to whole of society** Indeed, LCP is a unique planning tool for its consideration of costs and benefits to *the whole of society*. Certainly, these costs and benefits are not uniform. For example, given one transport system configuration, consumers of motor vehicle transport might receive benefits, but these benefits may come at the cost of another group in society, such as people who cannot drive and rely on non-motorised and public transport. LCP attempts to balance this and attain the optimal mix *across* society, maximising benefits to as many interest groups in society as possible, while minimising total costs.

**Allows consideration of a suite of options** It should finally be noted that LCP is not a one-off answer to determining transport system choices, but rather an input to decision-making which can be used alongside other decision-making methods. LCP is able to consider and recommend a *suite of options* and particularly assist decision-makers in prioritizing and investing in a *mix* of transportation solutions (Puget Sound Regional Council, 2000: 5). LCP thus provides a source of valuable additional information for decision-makers.

### ***Who participates in a Least Cost Planning process?***

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Decision-making undertaken using an LCP methodology has two distinct qualities. Firstly, LCP allows for an inter-governmental decision-making process incorporating local, state and federal governments (and inter-governmental methods of implementation). Secondly, the use of an LCP framework is highly consistent with increased use of public participation in transport decisions. These aspects are discussed briefly here and in more detail in the discussion of the US case study (see **Appendix B: Least Cost Planning Case Study: Destination '2030', Puget Sound, Washington, USA**).

**Inter-governmental decisions**

There are a wide variety of transport options suitable for consideration within an LCP framework. Some transport options may apply at a local level, for example pedestrianisation of a shopping area to encourage access on foot. Others apply at a state or regional level, for example a local bus service or cross-city bicycle route. There are also some like a national freight railway, the planning and regulation of which is the responsibility of the Commonwealth Government. Some categories, such as the private motor-vehicle, is relevant at all levels.

**Degree of consistency across the system**

The consideration of such a variety of options, whilst creating a degree of complexity in the decision making process, also has advantages. The capacity to formulate a transport plan that applies across different scales, and to determine the optimal mix of options for the transport system as a whole, means that LCP is able to ensure that there is a *degree of consistency* across the system. LCP thus provides for the development of a transport system that both accommodates the diverse requirements of that system, at the same time as directing all transport options to work towards maximizing the same set of benefits. The way this can be achieved in practice is by determining a unit of service, or functional unit. For example, depending upon the objectives of the process this could be the number of vehicle kilometres avoided. The cost of each option, expressed on a per VKT reduction basis can then be compared regardless of the scale of the option. This means the net benefit to the community associated with investing in a major high-speed train link can be compared with the benefit of developing cycle ways in a large number of cities and towns.

**Public participation**

A further distinguishing element of LCP is that it provides opportunities for meaningful public participation throughout the decision-making process. The public is able to be involved not only through submissions by special interest groups, but also in a general capacity as citizens. As the case study discusses, for example, the public were actively engaged in the development of a transport plan for the region of Puget Sound in the US, through public meetings and other fora. Transport planners strongly encouraged these processes with regular and detailed provision of information about the planning process. Such participation is a desirable element of transport planning, both because it is the public who will be most affected by any transport plan, and also because it may ensure greater political consensus, and greater acceptance of the ultimate outcome.

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## How is Least Cost Planning implemented in transport?

In this section, we discuss best practice processes for the implementation of least-cost planning approaches in transport decision-making. We then go on to discuss a primary feature of LCP – its consideration of a suite of transport options.

### *LCP best practice*

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#### **1. Determine objective/s of transport system**

The literature suggests a number of steps need to be undertaken to implement LCP. The various approaches have been consolidated to form our LCP best practice recommendations. The foremost step in any LCP approach is the determination of an objective for the transport system (Victoria Transport Policy Institute, 2003). ISF agrees, and suggests, that the basic objective of the transport system should be access, and thus LCP approaches would help identify how to service peoples' access requirements at least cost (Mozer, 2002). We further suggest that this initial stage is an ideal point at which to consult with the community in order to ensure that the systemic objectives do accord with community needs. This objective is likely to include identification of a transport need and performance measures that will be used to measure the merit of the different options that will be proposed (Nelson and Shakow, 1995).

#### **2. Define transport boundaries and risks**

Transport planners then need to define the systemic boundaries they wish to work within. This may be a local government area, or a state, or the whole country. Risks involved in making amendments to aspects of the transport system within these boundaries are then identified.

#### **3. Identify options for addressing transport system objectives**

The next step requires transport planners to identify all possible options. As mentioned above, these options need to consider both supply-side and demand-side approaches, as well as encompassing a mix of transport modes. Examples of options to include are: providing telework facilities and support; providing tailored travel information; car sharing programs, introducing a demand-responsive transport system (eg dial-a-bus services); or providing a new public transport service. As LCP involves multiple levels of government, such options may therefore include macro, systems-level solutions right down to individual options proposed at the community level – another opportune time to consult with the public and consider their suggestions.

**4. Evaluate costs and benefits of options, introduce intangible criteria, and rank options**

After identifying the options available to address identified transport needs, transport planners must then evaluate the costs and benefits of each strategic mix or each individual option, depending on the task. Using this data, the options are ranked according to their lowest cost – a rank determined partly, as mentioned earlier, by the inclusion of intangible factors impacting on potential benefits and costs of various options (DeCorla-Souza et al, 1999). This is also a stage at which public input is highly valuable. Please refer to **Appendix A: Least Cost calculations: Including intangible criteria and ranking options**, for further information regarding the inclusion of intangible criteria and the ranking of options.

**5. Select preferred option**

Planners at this stage select options to implement. ISF emphasises that LCP should be considered as one of many tools for transport planners, and one which can indeed be used *alongside* or *in conjunction with* other methodologies such as participatory decision making, multi-criteria analysis. LCP provides additional relevant data that can contribute to more informed and appropriate decision-making, rather than itself being a holistic planning solution.

**6. Implement preferred option**

The critical next step involves the implementation of the option or suite of options selected by transport decision-makers. In many circumstances this might entail the participation of a variety of levels of government, as well as community organisations.

**7. Evaluate, and adapt strategies in response to outcomes**

After implementing these strategies, the final stage involves evaluation of the implemented options against the performance measures identified at the outset. A feature of LCP to be stressed here is its flexibility; indeed, LCP is designed to evaluate the success of an alternative and to accordingly determine and implement any contingency plans in response to those levels of success. In its ability to adapt to shifting circumstances, but also to contribute significantly to systems level planning, LCP is an ideal tool for medium and long-term transportation planning (Victoria Transport Policy Institute, 2003).

In summary, the basic best practice procedure for applying LCP to transport decision-making involves the following steps:

- 1. Determine objective/s of the transport system**
- 2. Define transport boundaries and risks**
- 3. Identify options for addressing transport system objectives**
- 4. Evaluate costs and benefits of options, introduce 'intangible' criteria, and rank options**
- 5. Select preferred option**
- 6. Implement preferred option**
- 7. Evaluate, and adapt strategies in response to outcomes**

### ***LCP: A suite of options***

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#### **Breaches mutual exclusivity of supply and demand-side alternatives**

Transport planning has tended to traditionally focus on investing in transport infrastructure (supply-side options) (Greene and Wegener, 1997: 181). This focus is at the expense of the often more cost-effective travel demand management or other demand-side options. Furthermore, where dual implementation of supply and demand-side strategies has occurred, decisions to implement each strategic type have often take place in isolation of each other. LCP seeks to breach this exclusivity and to consider both strategies within the same decision-making framework and with access to the same sources of funding (Hazel, 1999: 85). In doing so, LCP vastly increases the available means with which to address a transport problem, and considers an array of transport options that vary widely in cost, scale and type. The availability of such a variety of potential solutions increases the ability of LCP to seek out the optimal and most appropriate mix with the lowest total cost to society, as well as to be more flexible and responsive to solving transport problems. Below, we discuss some of the issues relevant to the consideration of supply and demand-side options.

#### **Efficient use of current system**

Efficient use of existing transport assets is an immediate goal of a LCP approach (Bray, 2003: 5.11) and should be a consideration of transport supply-side initiatives. Such “fix it first” policies (Southern Environmental Law Center, 1999: 21) involve maintaining or modestly improving the standards of existing transportation infrastructure. They can also involve more efficient provision of transport services, by revising the frequency of services, providing linked or more integrated services (e.g. between different modes of transport), and providing new services. Continued systemic maintenance of this kind is often more cost-effective than increasing system capacity, and encourages a more considered approach to those decisions to indeed add to that capacity (Southern Environmental Law Center, 1999: 21). The provision of a reliable transport system with a *range* of available transportation modes can also encourage the modal switch of users to the most efficient mode available, further increasing the overall efficiency of the system.

#### **Transport demand management strategies**

Supply-side transport initiatives can be complemented by transportation demand management (TDM) strategies. TDM deploys a variety of strategies in order to encourage the more efficient use of transportation resources, and to encourage transport users to use alternatives to driving when appropriate (Litman, 2003). Strategies incorporated into a TDM approach include educative programs, incentives for alternative mode use, driving disincentives and land use policies (Litman, 1999: 2). One of the main advantages of TDM strategies is their cost of administration, which is often significantly cheaper than supply-side alternatives.



**Decouple  
accessibility  
from travel**

ISF argues that one of the greatest potential benefits of LCP is the unique opportunity it provides to address the overarching needs that transport systems serve – access. However, it should be noted that the end required is indeed society's need to access services and interactions, and that this need should not necessarily be coupled with the need to travel. Accordingly, LCP attempts to serve access requirements at lowest resource cost (Mozer, 2002), including, where possible, a reduction in peoples' need to travel to fulfill their access needs. This can be conceived as an increase in the *level of service* the transport and land-use system provides when working in an integrated manner.

**Dutch  
'ABC' land-use  
policy**

Indeed, land-use policy is a significant consideration in achieving the decoupling of accessibility from travel. The Dutch government has been a pioneer in developing land-use policies focused on accessibility; its 'ABC' location policy treats industry differently according to a range of access requirement zones. The zones range from those with good public transport service to those where road access is a premium. Firms are statutorily required to have accordingly different per-worker land allocations. Firms located closer to public transport need provide less land per worker, whereas those located closer to motorways need to provide a greater allotment (to account for parking space). Not only does such a policy encourage land-use planning that treats appropriate accessibility as a major concern, it also encourages the use of public transport (European Environment Agency, 2000: 57).

**Destination  
2030:  
Puget Sound,  
Washington,  
USA**

LCP has also been comprehensively applied in the Puget Sound region, which surrounds Seattle, in Washington, USA. Here, a LCP methodology is mandated by state, federal and regional laws. LCP is incorporated into an award-winning 30-year regional transport plan, *Destination 2030*, funded by these three levels of government and implemented on a local or sub-regional basis. Significantly, *Destination 2030* has involved active participation by the community, with continued public meetings and other opportunities to allow scrutiny of proposed options or proposal of further options. For further details regarding the implementation of LCP in Puget Sound, see **Appendix B: Least Cost Planning Case Study: 'Destination 2030', Puget Sound, Washington, USA.**

LCP thus provides planners with a way of comparing a suite of options combining traditional supply-side strategies with TDM initiatives, which allows transport planners to focus on improving efficiency and decoupling accessibility from travel.

There are some of critiques of LCP and these are discussed below.

### ***Criticisms of Least Cost Planning***

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There are two main criticisms of LCP and each will be addressed below.

Firstly, LCP is described as limited in usefulness as it applies at the systemic level. Secondly, as the benefits of different transport options are not homogenous, LCP, in attempting to measure all the benefits, has been called unrealistic, and again, limited in usefulness.

#### **LCP applies only at a systemic level**

The Puget Sound Regional Council, responsible for implementing LCP in Puget Sound, criticized LCP for its applicability at only the systemic level, comparing transport system options rather than individual projects (Kitchen, 2003). ISF disagrees. Whilst LCP does have a systemic-level focus, we believe that LCP calculations can also be made when comparing different projects. More importantly however, it should be remembered that LCP is one of many *tools* available to decision-makers. LCP is a complement to, rather than a replacement for, other planning methodologies like CBA that are designed specifically for project-level analysis (Nelson and Shakow, 1997). Rather than being a disadvantage, therefore, ISF argues that LCP's systemic-focus is an advantage in ensuring that the total costs and benefits of a *strategic mix* of projects is considered across the system and society, rather than the costs and benefits of projects in isolation.

#### **Transport benefits are not homogenous and cannot be measured meaningfully**

A further criticism made of LCP by the Puget Sound Regional Council is that the benefits of transport options are non-homogenous; that is, they differ in type (e.g. cost saving, improved health), as well as for different groups in the community (e.g. pedestrians, businesses). Thus it is argued that these benefits cannot be measured meaningfully. ISF also disagrees with this argument. We argue on the contrary that one of the main benefits of incorporating an LCP methodology into decision-making is indeed its ability to account for a broader range of costs and benefits. This is demonstrated particularly by LCP's inclusion of intangible factors which, being non-monetisable, are often excluded from planning methodologies that calculate only monetisable costs and benefits. We acknowledge that LCP can be perceived as being unrealistic as it does simplify data for the purposes of making broad calculations, but this is arguably the nature of planning. LCP is still highly valuable in ensuring that important intangible factors are included. This reflects reality in a significant way by recognizing the different costs and benefits of different transport options, for different community groups.

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## Why use Least Cost Planning in transport decision-making?

We have argued above that LCP offers a number of distinct, and in some instances, unique advantages for improving the decision-making process. An overview of those potential advantages follows.

### *Potential advantages of Least Cost Planning*

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The four main advantages of LCP are summarized here and discussed below. This process:

#### Four main advantages of Least Cost Planning

- 1. Incorporates a wider notion of costs and benefits**
- 2. Allows for a flexible transportation system**
- 3. Considers supply and demand-side alternatives together**
- 4. Encourages a balanced and diverse transportation system**

#### 1. Includes a wider notion of costs and benefits

LCP allows for an assessment of transportation alternatives that is more reflective of the whole cost to society. LCP is able to do this through the inclusion in its calculations of cost and benefit factors that are usually considered to be intangible. The LCP framework also allows the costs to specific interest groups who are affected by transport decisions to be identified.

#### 2. Allows for a flexible transportation system

ISF also argues that LCP can contribute to the creation of more appropriate transport solutions as it allows for the development of forecasted contingency plans. Furthermore, LCP processes include an important evaluative stage at which point the need for contingency plans can be assessed, and the plans revised for more suitable implementation. Thus, not only does LCP allow for middle and long-term transportation planning, it also allows those plans and indeed the transportation system itself, to be flexible and responsive to society's changing conditions (Victoria Transport Policy Institute, 2003).

#### 3. Considers supply and demand-side alternatives together

We have already discussed the potential advantages of this aspect of LCP in some detail above; namely, that by providing a single forum for the consideration and funding of equally valid transportation solutions, LCP equips transport planners with the tools to create the most optimal mix of transport options at the lowest possible total cost to society.

#### 4. Encourages a balanced and diverse transportation system

This potential advantage is associated with the one above. We suggest here that by considering all available transportation options together, greater multi-modality will result, providing society with more equitable access to goods and services. The varying costs and benefits of modes mean some groups become isolated and suffer transport disadvantage and

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social exclusion if private motor vehicle travel dominates. Both the elderly and the young often do not drive and a more balanced modal system is required.

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## **How can LCP be implemented to transport in Australia?**

LCP can be implemented on at three levels: locally, regionally, and state or city-wide. ISF suggest in this section a number of studies and programs that could be undertaken at each level in order to integrate an LCP methodology into transport decision-making in Australia.

### ***Local level***

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#### **Local program evaluation**

Significant progress has occurred in the implementation of TDM strategies at local levels throughout Australia. Some examples include:

- transport access guides developed for businesses, including the NSW Roads and Traffic Authority headquarters;
- vehicle sharing clubs;
- TravelSmart and related programs operating in most states of Australia;
- development control planning, including mandatory bicycle parking in the City of Canada Bay Council area in New South Wales; and
- well-established work-from-home initiatives.

The opportunity exists to evaluate a series of these initiatives, document the costs and benefits, and provide a ready reference for transport planners and those wishing to implement similar projects. Acquiring such an understanding would also be a necessary preliminary step to the successful introduction of LCP approaches to local transport decision-making processes.

### ***Regional level***

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#### **An active Household Travel Survey case study**

There are a variety of major studies or programs that can be conducted on a regional scale. One example would involve building on the *Household Travel Surveys* conducted annually by the Transport Data Centre, which survey the travel patterns of about 8,500 people in 3,500 households (Department of Infrastructure, Planning and Natural Resources, 2003). A more active component could be incorporated into the survey, modeled on the Bullitt Foundation's *Oil Smart* campaign, conducted each year in Puget Sound. The campaign has participants record their travel patterns over four days in order to demonstrate to people and planners the distances, time, costs and ultimately, potential savings to society as a whole, of participants selecting the least-cost option of travel (Litman, 1999: 14).

**Public for a  
and the  
conduct of  
Visual  
Preference  
Surveys**

***State or city-wide level***

The conducting of a state or city-wide participatory process could be used to inform strategic transport and city planning for the future. The process could involve holding a series of public fora that could focus on finding out the neighbourhood or metropolitan type the community actually prefers through *Visual Preference Surveys*. In Portland in the USA, for example, 4,500 residents viewed a number of slides of neighbourhood types and ranked these according to how desirable they found those types to be for their own area. The broad consensus was a preference for “pedestrian-oriented mixed-use development at transit stations and along main streets, with higher densities in central cities ... pedestrian oriented neighbourhood centers, ... and small parks and open spaces” (Holtzclaw, 1997). The broad distribution of information packages to extend community understanding of issues relating to the transport system would also be a feature of such a process.

The obvious benefit of consultative processes such as this is in building a strong, widely-endorsed mandate, such that fundamental systemic change can be ultimately more appropriate, publicly accepted and successful.

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**Conclusion: where to from here?**

As a means of contextualising and drawing together the discussion of LCP methodologies in this paper, we finally provide a hypothetical example illustrating the application of an LCP framework to a transport scenario in Australia (New South Wales’ metropolitan area).

***Hypothetical application of LCP in Australia***

**LCP applied in  
the NSW  
metropolitan  
area**

New South Wales currently has a target to stop the growth in vehicle kilometres traveled (VKT). This could be addressed in a number of ways (or in a combination of those ways), including by:

- pedestrianising Sydney’s CBD;
- building a dedicated bicycle network throughout the city;
- constructing light rail in the CBD;
- providing packages to employers including tax incentives which encourage active work from home policies; and
- significant transition from road to rail freight transport.

All of the above approaches would require significant investment, and there are also many other possible options. LCP provides a framework by which to compare and contrast the costs and benefits of these options, and could help, for example, to highlight the lowest cost option to address the stated objective in *Action for Air* of reducing VKT in Sydney.

### ***Future directions***

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This discussion paper has provided a concise overview of a Least Cost Planning approach in a transport decision-making context. We have focused on a number of unique planning opportunities that LCP provides, including: the opportunity to account for costs and benefits which are often considered intangible and tend to be excluded; the equal consideration and funding of a mix of supply and demand options and a mix of modal options; as well as the many opportunities LCP provides for multiple levels of government, and the general public, to actively participate in LCP decision-making processes. We countered the main criticisms of LCP, and highlighted the fact that LCP should be considered one of many valuable tools available to transport planners as opposed to a mutually exclusive and holistic solution. ISF firmly believes that LCP has many benefits, and that its inclusion in the decision-making process warrants further consideration. ISF welcomes further discussion and consultation on the application of LCP to improve the transport system.

## Appendix A: Least Cost calculations Including intangible criteria and ranking options

**Introduction** In our discussion paper, we set out a best practice procedure for applying LCP to transport decision-making. In this appendix, we explain the methodology for conducting part of step 4 of that process:

### 4. Evaluate costs and benefits of options, introduce 'intangible' criteria, and rank options

#### *Including intangible criteria*

After the monetisable costs and benefits of options have been measured, intangible criteria must also be considered. As these criteria are often difficult or impossible to monetise meaningfully, their magnitude should be estimated and ranks allocated to each criteria. These ranks will then be used in trade-off evaluations to give weight to some options or to reduce the attractiveness of others (DeCorla-Souza, 1999).

**Examples of intangible criteria** Litman provides an extensive list of intangible, or non-market, costs, that transport planners should consider. They include: accident risk; equity; air pollution; noise pollution; resource consumption; barrier effect (the impact motorised traffic has on non-motorised modes such as walking or cycling); land-use impacts; water pollution; and waste disposal (Litman, 1997: 145).

**Intangible criteria rank matrix** The Victoria Transport Policy Institute (VTPI) has developed a rank matrix that adapts this list of intangible criteria to measure the extent to which a transport option is beneficial or harmful. A rank of 3 indicates that the option is very beneficial for promoting that transport objective, a rank of -3 suggesting that the option is very harmful for promoting that transport objective. We have included the VTPI's sample matrix below.

#### *Intangible Criteria Rank Matrix*

Objective	Rating	Comments
Congestion Reduction	2	Allows the most cost effective congestion reduction solution.
Road & Parking Savings	3	Allows most cost effective solutions to road and parking problems.
Consumer Savings	2	Tends to improve transport choice.
Transport Choice	2	Tends to increase modal choices.
Road Safety	2	Tends to reduce automobile use.
Environmental Protection	2	Tends to reduce automobile use.
Efficient Land Use	2	Tends to encourage more efficient land use.
Community Livability	2	Tends to reduce automobile use.

**APPENDIX A  
CONTINUED**

**Ranking options**

Different transport options should be ranked in accordance with their overall least cost. This provides transport planners with additional data; depending on how different the transport options are, for example, it may provide broad indicators as to which option provides greater benefits to society overall, as well as some inference as to which specific strategies contribute to that. We have provided below our summary table of the different transport options that were available to the Puget Sound Regional Council when devising their *Destination 2030* transport plan.

**Transport Option Ranking Table**

	Updated 1995 MTP#	Current Law Revenues	MTP Plus A	MTP Plus B
<b>INVESTMENT APPROACH STRATEGIC OVERVIEW</b>				
<b>Brief Overview</b>	Project programs already in place in 1995 extended to 2030	Project programs in place in 1995 with committed funding extended to 2030	Project programs in place in 1995 extended to 2030 plus new projects with an <i>infrastructure</i> emphasis	Project programs in place in 1995 extended to 2030 plus new projects with <i>system management</i> emphasis
<b>Investment Mix</b>	Balanced multi-modal investments	Lack of balance in modal investments; transport viewed in isolation	Balanced multi-modal investments with an emphasis on infrastructure solutions	Balanced multi-modal investments with an emphasis on system management solutions
<b>Treatment of Infrastructure</b>	Infrastructure and system management expansion	Limited infrastructure and system management expansion	Major infrastructure but also some system management expansion	Major system management but also some infrastructure expansion
<b>Public capital expenditure</b>	Large public capital expenditure	Low public capital expenditure	Large public capital Expenditure	Large public capital expenditure
<b>Growth Strategy</b>	Prioritises infrastructure and programs to actively advance growth strategy	Does not actively advance growth strategy	Considerable increase in capacity, particularly with freeways and HOVs*, with a focus on system performance	Considerable increase in capacity, with freeways, HOVs, but also transit and intelligent transport systems; focuses on system performance
<b>Attitude to Pollution</b>	Designed to support air quality conformity requirements	Not supportive of air quality conformity requirements	Designed to support air quality conformity requirements	Designed to support air quality conformity requirements
<b>Strategy Highlights</b>	→ Accessibility and mobility with mobility options. ✓ → Considerable build up of freeway, arterial and HOV lanes are key features. ✓	→ Assumes no change in funding system over 30 years. → Limited increase in freeway, arterial and HOV lanes. Limited ferry service.	→ Significant increase in freeway, arterial and HOV lanes – more than 'Updated 1995 MTP'. → Also transit system improvements.	→ Some increase in freeway and HOV lanes. → Also intelligent transport systems. ✓ → Increase in transit routes and hours of around 50%. ✓ → Also looks at bicycle and pedestrian routes, urban development, and parking pricing strategy. ✓
<b>INVESTMENT APPROACH EFFECT ON MODAL SPLIT BY 2030^^</b>				
<b>SOV**</b>	62% (2000)	56%	57%	54-55.4%
<b>Carpool</b>	35% (2000)	39%	39%	39%
<b>Transit</b>	3% (2000)	5%	5%	5-6%
<b>INVESTMENT APPROACH COST FACTORS PER AVERAGE NEW TRIP (US\$)</b>				
<b>Public Sector Cost</b>	\$0.60	\$0.30	\$0.83	\$0.80
<b>Congestion Cost</b>	\$0.21	\$0.47	\$0.14	\$0.18
<b>Pollution Cost</b>	\$0.06	\$0.10	\$0.04	\$0.04
<b>Personal Vehicle Ownership and Operation Cost</b>	\$0.66	\$0.78	\$0.78	\$0.59
<b>Travel Time Cost</b>	\$0.73	\$0.71	\$0.71	\$0.62
<b>Total Cost Per New Trip without travel time</b>	\$2.18	\$2.31	\$2.36	\$2.24
<b>Total Cost Per New Trip with travel time</b>	\$2.91	\$3.01	\$3.01	\$2.86
<b>INVESTMENT APPROACH RANK IN TERMS OF COST PER NEW TRIP WITH TRAVEL TIME (Least costly = 1)</b>				
<b>RANK</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>

\* MTP: Metropolitan Transport Plan \* HOVs: High Occupancy Vehicle lanes \*\* SOV: Single Occupancy Vehicle

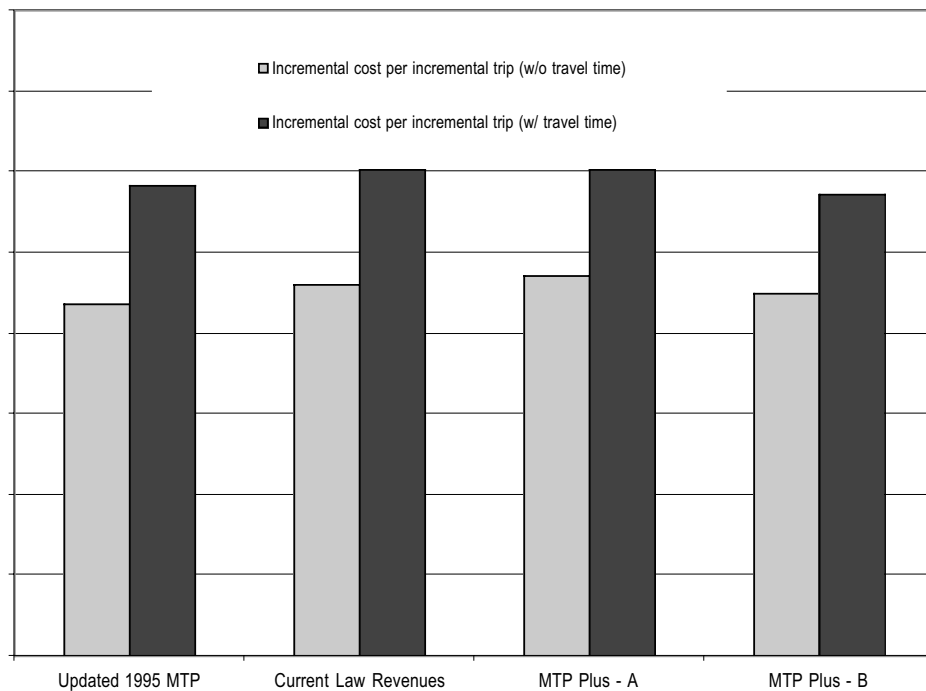
^^ MTP Plus A and MTP Plus B were assessed together

✓ indicates aspects of plan incorporated into final Metropolitan Transport Plan



**APPENDIX A  
CONTINUED  
Explanation of  
transport  
option ranking  
table**

As the table above demonstrated, in Puget Sound, transport planners were initially considering four options for revising the transport system over a 30-year period. The first option, *Updated 1995 MTP* (Metropolitan Transport Plan), extended current projects and planned projects and provided additional funding, over thirty years. The second, *Current Law Revenues*, was the business-as-usual option and did not provide for expanded funding. The other two options, *MTP Plus A* and *MTP Plus B*, involved adding additional funding and programs onto the current transport system to create a more balanced, multi-modal transport system. The diagram below, produced by the Puget Sound Regional Council (Kitchen, 2003), depicts the section of our table entitled "Investment Approach Cost Factors Per Average New Trip (US\$)", and is the final cost analysis of a new trip under each transport option.



Source: Kitchen, 2003.

**Informed  
decision  
making**

In the "Strategy Highlights" row of the transport option ranking table, the ticks we have included indicate the aspects of the plans that were ultimately incorporated in Puget Sound. It should be noted that it was not a particular option that was chosen exclusively in Puget Sound; rather, the transport plan incorporated aspects of two options; *Updated 1995 MTP*, and *MTP Plus B*. This highlights what ISF argues to be one of the key features of LCP; the fact that it is not mandatory to select the least cost option. Instead, LCP should ultimately be seen as a tool for transport planners, providing highly relevant data, and one of many methodologies that planners should apply.

## **Appendix B: Least Cost Planning Case Study 'Destination 2030', Puget Sound, Washington, USA**

**Introduction** *Destination 2030* is an award-winning long-term transportation plan incorporating a least-cost planning methodology. A Washington state government initiative, it is a 30 year plan to conclude in 2030. Its aim is to create a regionally integrated multi-modal transport system throughout the Puget Sound area, which has a population of 3 million. *Destination 2030* is also designed to cater for Washington's future growth in population and the resultant growth in travel trips. Improving the community's mobility and reducing traffic congestion would be the main objectives of the plan and its success would be measured against these.

### ***Mandated by legislation***

**Regional legislation** Three levels of legislation are involved in the implementation of *Destination 2030*. Firstly, a Washington state law that took effect in 2000 requires the use of least-cost planning in all transportation planning (*Revised Code of Washington 47.80.030*). A least-cost planning methodology is to be used when considering the costs and benefits of different transport system alternatives. However, whilst the cost-effectiveness of different alternatives is to be considered, it is not mandated that the least-cost alternative be that which is selected for ultimate use.

**Federal legislation** The second level of legislation is federal, and requires that all long-range transportation plans be consistent with federal law including TEA-21 (the *Transport Equity Act for the 21<sup>st</sup> Century*). US federal law does not explicitly refer to least-cost planning, but it does suggest that the preservation and efficient use of the transport system is a critical consideration (*23 United States Code 134*).

**Local legislation** Finally, and at the regional level, an *Interlocal Agreement* is in force in Puget Sound, which empowers the Puget Sound Regional Council (PSRC) to both develop a regional transportation plan and to insist that local governments include elements of the regional plan in their local plans (*Puget Sound Regional Council Interlocal Agreement for Regional Planning in the Central Puget Sound Area*). This ensures some level of uniformity in the goals of transportation plans throughout the region.

### ***LCP applied in Destination 2030***

*Destination 2030* applies least-cost planning at the broad systems level of analysis as an aid to decision makers, generating information relating to the costs and benefits of transportation demand and supply strategies. Under the least-cost planning framework, and because of the significant

**APPENDIX B**  
**CONTINUED**

congestion problem in the Puget Sound region, which the PSRC estimates “wastes ... between \$1.5 and \$2 billion” of residents’ and businesses’ money annually (Puget Sound Regional Council, 2003a: 6), one of the primary benefits considered is the reduction in peoples’ travel time.

**Sensitivity analyses**

Sensitivity analyses are also factored into the determination of least-cost. Here, the value of each cost factor is expressed monetarily, and these costs are then used to discount the benefits of different alternatives. In Puget Sound, the cost factors considered are: vehicle ownership and depreciation; vehicle operation; parking; freight costs; costs of other types of private vehicles; public infrastructure’s maintenance and preservation; congestion; accidents; pollution factors – namely air, water and noise; and the cost of travel time.

**Implementing Destination 2030**

Initiatives under *Destination 2030* are implemented at the local and regional levels of authority. This is done in order to reflect the diversity between the various regions in Puget Sound and emphasises a mix of localized strategies as the best way of achieving the plan’s overall outcomes.

**Progress of Destination 2030 to date**

In the two years that *Destination 2030* has been in operation, a number of transport projects have been implemented. They have focused on extending or maintaining the current transport mix of freeways, and transit such as rail, bus, light rail and ferry services. The use of non-motorised transport has also been encouraged with improvements to pedestrian accessibility and the planned building of 460 kilometres of on-road bicycle lanes. Measures have also been taken to improve efficiency of use of the transport system through the allocation of many high-occupancy vehicle preference lanes to encourage car-pooling. There have also been improvements to freight and goods transport routes. These initiatives have cost US \$2.25 billion.

***Multiple sources of funding***

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The three levels of legislative authority all contribute to the funding of Destination 2030 to different degrees. Significant federal funding is provided to Washington state transportation authorities and is prioritized for use on highway initiatives. The federal government also has in place a program known as the *Transportation and Community and System Preservation Pilot Program* to allocate additional transport funding to specific transport programs within the United States. The program focuses on rewarding transport plans which improve efficiency, reduce environmental damage, and which generally look to long-term efficiency and equity. In 2002 the program awarded \$273 million across 221 projects in 47 states (U.S. Department of Transportation Federal Highway Administration, 2003: 1-2).

**APPENDIX B**  
**CONTINUED:**  
**Allocation of**  
**funding**

The State transportation authorities then allocate funding to regional authorities, again for use on specific projects. Up to half of State funding concentrates on improvements to major highway corridors, while significant funds are also devoted to different transit alternatives, particularly ferry services and high-occupancy vehicle lanes. Washington state authorities are expected to provide funds for up to two thirds of *Destination 2030's* cost until 2010 - around US \$24 billion. This overcomes the difficulty that the plan had encountered until recently of the electorate's continued curtailing of tax revenues upon which all transportation authorities in the region had traditionally relied for funding. Local transport authorities meet the balance of transportation funding, some US\$ 8 billion to 2010.

**Projects**  
**funded**  
**between 2001**  
**and 2003**

The funding of projects between 2001-2003 overall demonstrated two major project preferences: a mix of transit alternatives (receiving US\$926 million), including rail, bus, light rail, and ferries; and freeways, which received US\$776 million in funding. High occupancy vehicle preference lane implementation and freight mobility management schemes equally shared the remaining US\$500 million in funds.

***Public participation***

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The public were actively involved in the development of *Destination 2030*. Public meetings were held throughout the project scoping process to involve citizens in discussions on alternatives for the plan, and the PSRC also held 240 meetings with interest groups. The PSRC further circulated information about the plan via mail, telephone calls, newspaper advertisements and cable television broadcasts, throughout the project development stage.

**Public plays**  
**an important**  
**and active role**

The public continues to play an important role in the decision-making of *Destination 2030* in accordance with the PSRC's Public Participation Plan. Public submissions are regularly invited for any proposed project and the public is invited to each PSRC General Assembly. Indeed, the public often exercises significant authority in the approval of projects - it is voter approval of a Citizen Petition that has allowed planning and construction for a major Seattle monorail line to commence.

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