

PROVIDING SUSTAINABLE TRANSPORT SOLUTIONS

How can we meet the increasing desire for mobility and protect our quality of life?

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ABSTRACT

Recent history has shown an increasing desire for mobility; with increasing wealth, population, urbanisation and car ownership the trend has been for increasing demand for travel and it would be expected that demand, on the whole, will continue to grow.

While the advent of the car in developed countries has provided an unsurpassed level of personal transport, the unsustainable outcomes of congestion, emissions and inequality across groups in society must be addressed. At the same time, sustainability principles of providing for the present without detracting from the future need to be incorporated in the planning processes to protect the quality of life potential for future generations.

Sustainable mobility solutions are complex and necessarily involve a number of facets that must consider three key criteria of the economic, environmental and social well-being of a community both now and in the future. Socio-demographic characteristics also influence the mobility needs of the community, and as social structures change mobility provision needs to respond.

The key transport issues that will be required to be addressed over the next 30 years are in the areas of congestion, efficient movement of people and goods, safety, emissions of greenhouse gasses and air pollutants, impacts on biodiversity and meeting the mobility needs of society.

Our roads are becoming more and more congested. As road systems reach maturity, the scope to increase capacity is limited and congestion is expected to continue to increase in many cities throughout the world. This imposes a large cost on society, both economically through increased vehicle operating costs and travel times and environmentally through increased emission of greenhouse gases and noxious pollutants.

Efficient, effective and competitive movement of freight is dependant on the existence of a well planned, sustained and interconnected road, rail, air and sea network. Road freight is likely to remain the dominant mode of moving goods, providing flexible linkage between the generators and the consumers or other modes for onward transportation.

Safety is a significant transport issue that directly impacts society and our quality of life. Death or serious injury from transport accidents cause pain, suffering and financial problems in society and road transport accounts for the majority of these accidents.

The structure of society is also changing and with it mobility needs of different sections are becoming increasingly significant. The increase in the number of women working outside of the home has resulted in increased car trips. The aged, youth, disabled and poor can be "mobility disadvantaged" in society as access to private car travel can be dangerous, difficult, illegal or cost prohibitive. If we are to provide "mobility equity", a range of quality and affordable alternatives to the private motor vehicle need to be readily available to these sections of society.

Providing greater mobility choice, improved public transport services and measures to reduce the need to travel will come some way in addressing these concerns, especially that of equitable access. Implementing measures that make the way we move people more sustainable requires public acceptance and thus these measures must result in a transport system that provide for people's needs. Policies and programs are being implemented in many countries to increase the use of walking, cycling, public and community transport and are important measure to drive change and provide better transport choice. Programs and investment to improve the frequency, reliability, comfort, safety, security and connectivity of public transport assist in attracting more passengers and creating a shift in the mode share.

However, while it is likely that car and road freight will remain the dominant method of moving people and goods in developed countries, advances in technology and telecommunications will need to help mitigate its adverse outcomes and protect our quality of life.

In the short to medium term future, in-vehicle technology such as advanced-warning and crash-avoidance systems has the potential to improve safety and improved engines and alternative fuel will help reduce emissions of greenhouse and other air pollutants. The management of traffic and travel demand is also expected to be significantly more efficient through the use of advanced information technologies.

In the medium to long term future, Intelligent Vehicle Highway Systems (IVHS) and Intelligent Transport Systems (ITS) are systems that will apply information, communication and control technologies to help the operation of transport networks. This will assist in reducing the congestion and the resultant greenhouse emissions.

A fundamental consideration that must be retained is that transport is primarily a derived demand. Transport of both people and goods takes place so that people can benefit from the access it provides to work, recreation, education or to a range of services and goods; all of which affect quality of life. Demand management measures such as telephone and internet shopping, teleworking, telecommuting, working from home, tele-education and tele-conferencing are all virtual substitutes for transport.

An innovative proposal by the authors of this essay relates to the implementation of a "Transport Plan". The Transport Plan would provide a user-pays systems for all modes of transport and could be part of an electronic "SmartCard" account linked to the banking system. Like purchasing mobile telephone plans today, the user would be able to purchase a transport plan that is appropriate to their needs. Using the transport system in periods of high demand would cost more, as mobile telephone calls in peak periods do today. Prices could be set to reflect the overall infrastructure, maintenance, congestion and environmental cost of the chosen mode, location and time of travel. All other taxes and charges related to transport, such as fuel excises, registration fees and public transport tickets, would be removed to provide one comprehensive and clear payment system. This will allow the user to make more informed choices about how and when they travel and to evaluate and rationalize their travel requirements into a plan that suits their needs. This scheme would also assist transport managers in ensuring that the system was not overloaded, but rather operated in a balanced manner.

1. INTRODUCTION

Recent history has shown an increasing desire for mobility; with increasing wealth, population, urbanisation and car ownership the trend has been for increasing demand for

travel and it would be expected that demand, on the whole, will continue to grow. While the advent of the car in developed countries has provided an unsurpassed level of personal transport, the unsustainable outcomes of congestion, emissions and inequality across groups in society must be addressed. At the same time, sustainability principles of providing for the present without detracting from the future need to be incorporated in the planning processes to protect the quality of life potential for future generations. Sustainable mobility solutions are complex and necessarily involve a number of facets that must consider three key criteria of the economic, environmental and social well-being of a community both now and in the future. Socio-demographic characteristics also influence the mobility needs of the community, and as social structures change mobility provision needs to respond. Providing greater mobility choice, improved public transport services and measures to reduce the need to travel will come some way in addressing these concerns, especially that of equitable access. However, while it is likely that car and road freight will remain the dominant method of moving people and goods in developed countries, advances in technology and telecommunications will need to help mitigate its adverse outcomes and protect our quality of life.

2. WHERE ARE WE NOW AND WHY?

Early 2000s in a modern city metropolis

*David, the young 30 something transport professional scans his rear view vision mirror as he leaves the quiet surrounds of an outer metropolitan neighbourhood and hits the back of the motorway queue 20 km from work. From this point on it would be slow going, time wasted for the next hour or so. He had to leave the house early this morning before his children woke and wondered what answer he would provide his 7 yr old daughter when asked why “Dad could not take her to school that day” or any other day for that matter. **Time spent in traffic was not his idea of quality of life when he could have spent it making a little child happy.***

*Each day David’s wife drove the children in their “family” car to child care and primary school on her way to her part-time job. In the afternoon, she would pick up the children, and do the day-to-day running about such as grocery shopping, dropping and picking up the children to various activities and friend’s houses and visiting and providing lifts for her elderly mother who could no longer drive. **She really needed the car; so many trips to make during a typical day and the car offered security, taking his family door-to-door.** Two cars in the family was an additional expense, could they make do with one car if he found an alternative way to work?*

*The roar of a lowly patroned bus using the emergency lane briefly pervaded David’s environment, as the sign flashed “Bus to city 12 minutes.....Car to city 35 minutes”. Perhaps he could use public transport instead, but it wouldn’t take him door-to-door, he would need to walk or get a lift to the express bus station at both ends as the local bus system was unreliable and did not connect well with the express service. This would make getting to work on time risky and probably mean having to leave even earlier in the morning. The transit lane may be an option if he could find someone with whom to carpool. His time may be better spent bicycling to work along the off road path adjacent to the freeway and getting some much needed exercise or he could perhaps he use the “Park and Ride” facility, the first of its kind in the city, that had recently opened. If only he could work close to, or at, home. **Although the congestion was becoming intolerable on his trip to work, the alternative transport means did not appear to be more attractive.***



*David thought of the people living adjacent the freeway, on the other side of the high noise barriers. He would hate living there, but if the cars and trucks were not on the freeway then they would be invading the local street network. **He changed the air intake setting in the car to recycle, as the fumes from buses and cars permeated the cabin of his car.***

*David cast his mind back to a different time and place to put some perspective into his thought processes and wondered if he was any better off in a transport and quality of life sense from the developing country that he had come from. He had grown up in a place where tens of millions of people crammed their lives into the sprawling city hoping to find a better life away from the poverty of the rural areas. People walked or rode bicycles, used rickshaws (human powered people movers) and rode in (and on top of) trams, buses and trains. Goods were moved by a range of means varying from bullock carts to truck. **In developing countries, cars could be afforded by few and were not the main form of transport, but still created pollution and congestion in the densely inhabited city.***



David noted memorial flowers at the base of the light pole and the recently installed safety barriers in the median, reminding him of an aspect of life that he valued most, and that was safety. Safety considerations were a world apart in the city of his childhood but at the time he had never considered the danger of the roads. He now felt apprehensive when returning for a visit and travelling in the back of a taxi. He would automatically look for the seat belt that was inevitably not there, and would hang on nervously as the taxi weaved urgently around other cars, trucks, animals, cyclists and the brave pedestrians who dared to step out to cross the road.

*Quality of life was really relative. People in the country of David's childhood had basic concerns, taken for granted in developed countries, such as clean running water, reliable electricity, poverty and disease. David's concern over the time he spent commuting every day could seem insignificant when he thought of the issues they faced, however, transport issues did impact his quality of life, in both positive and negative ways. **How could his transport needs be met in a better way in the future?***

Since the Second World War demand for travel in developed countries has increased significantly. The spread of the suburbs and associated road systems as well as increased car affordability and ownership levels has seen the private motor vehicle providing for most of the increased travel demand. In 1995 in Australia, total travel in the urban areas had grown to be almost 9 times the level of 1945. In the 1940s, the share of travel by rail and car had been at about the same levels. However, the growth in transport demand has basically been confined to the use of the car, with private motor vehicles contributing 93 percent of motorised urban trips in 1995 compared to about 40 percent in 1945.¹ Recent history has also seen an increasing demand for movement of goods, whilst the share undertaken by rail has decreased. Since 1975 in Australia, the rail share of non-bulk freight has declined from 60 to 35 percent despite the task tripling over that period.²

So what are the trends in truck and traffic growth? The Bureau of Transport Economics in Australia predict urban car travel to continue to grow in Australia over the next 20 years by close to 30 percent, though at a somewhat slower rate of growth than for the last few

decades.³ Traffic volumes are expected to increase more rapidly than car travel growth, because the trend in the commercial road traffic is stronger than for private travel.³ A similar picture is forecast in other parts of the world. The European Commission identify the relationship between economic growth and increased mobility and forecast a 38 percent increase in goods transport and 24 percent increase in passenger transport by 2010.⁴ While growth in car travel is expected to continue to slow down, there has been an increasing rate in growth of goods transported by road. In Australia, the tonne kilometres by truck has increased eight-fold since the 1960s and can be shown to have an almost linear relationship to the growth in the Gross Domestic Product, which is growing exponentially.³ Given existing trends, the European Commission also expect a 50 percent increase in heavy goods vehicle traffic within the next 10 years, if no action is taken to change the trends.⁴

Looking back on the substantial growth in road travel indicates that there will continue to be an overall increase in the demand for travel, albeit at a slower rate. As growth in the demand for car travel is slowing and road freight is increasing, providing for efficient freight movement will become an increasingly significant task.

3. KEY TRANSPORT ISSUES

The increasing desire for mobility, and in particular the rise in the demand for road travel for both goods and people, has led to undesirable impacts on our quality of life. Adverse outcomes from increased road travel such as congestion, road accidents, greenhouse gas emissions, pollution, reduced biodiversity and social inequity in transport provision are key issues that need to be addressed in order to protect our economic, environmental and social well being, and ultimately our quality of life. In addressing these issues, sustainable solutions need to be achieved so that in providing for the present we do not detract from the ability of future generations to meet their own needs.

Economic and financial sustainability requires that resources be used efficiently and that assets be maintained properly.

Environmental and ecological sustainability requires that the external effects of transport be taken into account fully when public or private decisions are made that determine future development.

Social sustainability requires that the benefits of improved transport reach all sections of the community. (World Bank, 1996)

Sustainable mobility solutions are complex and necessarily involve a number of facets that must consider three key criteria of the economic, environmental and social well-being of a community both now and in the future. Economic sustainability could be defined as providing efficient and competitive movement of goods and people. Environmental sustainability means protecting our built and natural environment and thus finding measures to tackle the adverse impacts on greenhouse gas levels, pollution levels, biodiversity and water quality. Social sustainability means ensuring we provide “mobility equity”, providing quality transport choice for all sections of society.

3.1 Congestion

Our roads are becoming more and more congested. As road systems reach maturity, the scope to increase capacity is limited and congestion is expected to continue to increase in many cities throughout the world. This imposes a large cost on society, both economically through increased vehicle operating costs and travel times and environmentally through

increased emission of greenhouse gases and noxious pollutants. Our quality of life is directly affected by increased travel time as a result of congestion. Time spent traveling is not in itself productive, and as the hours in the day of potentially productive activity are finite, spending more than a set amount of time per day traveling disadvantages the individual affected by it. In Australia, approximately half the urban vehicle kilometers travelled are currently performed under congested conditions.⁵ The estimated social costs of this congestion is approximately AU\$12.8 billion (1995), considering the excess travel time and other resource costs (such as fuel), and if nothing is done, it is expected that this cost will rise to about AU\$29.7 billion by 2015.¹

Although, congestion can impose a large cost on the motorist, “automobile dependence” of cities can mean that car travel can be the only option available or other options can not compete, even given the high congestion levels of the road system. Automobile dependence is a phenomenon that negates many of the great benefits of the motorcar and undermines a city’s prosperity and liveability.⁶ Cities around the world are not static and are showing tendencies towards greater or less auto dependence depending on the policy initiatives in the areas of land use change, road transport change, public transport change and transport behavioural change. Table 1 shows key factors associated with automobile dependence for a sample of international cities. Furthermore, developing countries can suffer intense problems associated with road vehicles, not because of dependence but auto-saturated urban environments at car ownership levels of less than 100 cars per 1000 people. Developing cities in Asia, South America, Africa, and other regions are auto-saturated because of the fundamental spatial problem that they are not built for high levels of automobile or motorcycle use, but retain forms optimised for public transport and non-motorised modes.

Table 1: Some key factors associated with automobile dependence (1990)⁶

Factor	US Cities	Australian Cities	European Cities	Developing Asian Cities
Urban Density (persons per ha)	14.2	12.3	49.9	166.4
Cars per 1000 persons	604	491	392	102
Private passenger vehicle km per capita	11,155	6,571	4,519	1,848
Rail service intensity (service km per urban ha)	153	287	3,651	639
% of total motorized passenger km on transit	3.1	7.7	22.6	40.2

3.2 Efficient Movement of Goods and People

Efficient, effective and competitive movement of freight is dependant on the existence of a well planned, sustained and interconnected road, rail, air and sea network. As discussed earlier, road freight is likely to remain the dominant mode of moving goods, providing flexible linkage between the many generators and the consumers or other modes for onward transportation. Completing freeway links between key transport corridors in cities helps to improve freight efficiency and remove unwanted trucks from the suburbs. Consolidation of road freight movements onto a smaller number of larger vehicles also improves fuel efficiency per tonne moved, reduces the road space consumed and visual and noise impacts of freight. Improvements in intermodalism, the smooth transfer of goods

between modes, also offers opportunities for improved efficiency in the movement of freight. The introduction of real-time vehicle monitoring systems will allow improved routing of vehicles and the monitoring of compliance with road rules to improve freight efficiency and safety.

As congestion of road systems increases and the scope to increase capacity diminishes, priority in the use of road space needs to be given to efficient movement of goods and people. As road based public transport moves more people per vehicle, priority measures should be given to improve its performance, such as providing exclusive use of some roads and traffic lanes. At the same time, the movement of goods by roads is an important and increasing task, and requires priority over other users, such a single occupant vehicles, which become an inefficient use of road space in congested conditions. In planning and managing road systems and considering public transport and freight priority measures, evaluation of people and goods throughput, rather than the traditional measure of vehicle throughput, is required as well as consideration of the environmental and social impacts of management options.

3.3 Safety

Safety is a significant transport issue that directly impacts society and our quality of life. Death or serious injury from transport accidents cause pain, suffering and financial problems in society and road transport accounts for the majority of transport accidents. Significant improvement in road safety in developed countries has been achieved over the years, even with the substantial increase in the total distance travelled by road. The introduction of initiatives such as compulsory use of seat belts, investment in safer road design and roadside safety, promotional and educational campaigns, legislation and enforcement of road rules including blood alcohol limits and new vehicle and on-road technologies have helped to reduce the number of fatalities and serious injury accidents on the road. In Australia, the total number of road fatalities dropped from 3,798 deaths in 1970 to 1,759 deaths in 1999.² The strong downward trend, however, has considerably slowed in recent years and additional initiatives and technology improvements are required to continue the improvement in road safety. Road safety strategies also need to consider the changes in society, such as the large increase in the number of aged drivers.

3.4 Emissions of Greenhouse Gas and Air Pollutants

Human actions such as burning fossil fuels and land clearing are increasing the concentration of greenhouse gases in the environment, leading to global climate change. Climate change may impact the world's weather patterns, increasing flooding and rainfall in areas and producing droughts in other areas, and this is of concern to the world community, as reflected by the Kyoto Protocol to reduce emissions. Transport and especially road transport are significant contributors to greenhouse gas emissions. In Australia, 16 percent of total greenhouse gas emissions come from the transport sector with approximately 89 percent of the transport emissions emanating from road transport including a third from commercial vehicles.⁷ The European Commission estimates that 28 percent of emissions of CO₂, the main greenhouse gas, in Europe are due to transport with road transport comprising 84 percent of these emissions.⁴ Emissions of air pollutants (CO, NO_x, SO_x particulates, lead) from road transport also have local impacts on health.

Measures to reduce emissions of greenhouse gas and noxious pollutants from freight and passenger transport include land use and transport planning, travel demand and traffic management, encouraging greater use of public transport, walking and cycling, use of alternative fuels and improved engine efficiency through design, legislation and

maintenance. Congestion is also a major contributor to vehicle emissions and measures to increase traffic efficiency are required. Fuel consumption per vehicle under congested conditions is approximately twice that under free-flow conditions, doubling the output of greenhouse gas and noxious pollutants.⁵ Future initiatives will help reduce congestion such as road pricing or Intelligent Highway Systems.

3.5 Biodiversity

Road and rail transport can cause divisions or barriers for flora and fauna. These divisions can have significant and permanent effects on the local environment. In many countries, where local farming techniques are actively damaging the environment, these routes can also represent the only native area in which flora and fauna can survive. In planning transport infrastructure, the impact on flora and fauna must be considered in evaluation processes.

3.6 Mobility Needs of Society

The structure of society is also changing and with it mobility needs of different sections are becoming increasingly significant. Over the last 30 years, the substantial increase in the number of women working outside of home means that they are undertaking more trips each day. The private vehicle has offered women a “personalised form” of transport, responding to their desire for multi tasked trips and security concerns. The benefits offered by the car over other forms of transport are shown to be substantial for women and this needs to be understood when considering the practicality of policies to shift mode share from the private vehicle to public transport.

The aged, youth, disabled and poor can be “mobility disadvantaged” in society as access to private car travel can be dangerous, difficult, illegal or cost prohibitive. If we are to provide “mobility equity”, a range of quality and affordable alternatives to the private motor vehicle need to be readily available to these sections of society. Poor access to public and community transport can have a large impact on low income families. The cost of running a car can be a major burden on low income families and can account for 25 percent of the household income.² Public transport, walking and cycling can all offer viable alternatives, however, when considering the aged and disabled, other initiatives are also required.

The aged is a growing proportion of society in developed countries. It is estimated that in 20 years time, almost 1 in 5 people in the United States⁸ will be aged over 65 and almost 1 in 4 in Melbourne Australia⁹. Transportation provision needs to consider the needs of this significant section of society. Katherine Freud of the Independent Transportation Network in the United States states in her paper “Alternative Transportation for the Elderly” that:

There is growing recognition that the nation’s transportation system does not meet the mobility needs of normally aging people. This is because seniors, like the great majority of the U.S. population, depend largely on the private automobile for transportation. This dependence results in serious safety and mobility problems for diminished-capability elderly drivers...

In an effort to remain safely behind the wheel, older drivers limit the time, location and frequency of their trips. Often they do not drive at night, and avoid interstate highways, busy intersections, inclement weather, rush hours, and unfamiliar locations.

Katherine Freud continues to explain that the effort to solve the “older-driver problem” through stricter licensing measures may address public safety concerns but ignores the mobility issues. Shifting to public transport is not necessarily the answer either, as the

elderly can often experience difficulty in walking and prefer the comfort and ease of a door-to-door service. The Independent Transport Network (ITN) is a pilot “community transport” system established in Portland, Maine in the US to respond to the mobility needs of the elderly and provide an economically sustainable solution, considering the growing need for mobility for the aged. The ITN is a 7 days a weeks, 24 hours a day service providing at-call transport for members in an ITN vehicle. Members pay a small annual fee and have a prepaid transportation account that is debited monthly for the distance travelled. A mixture of volunteer support and merchant sponsorship assist in keeping costs low. The member is also encouraged to sell their car to finance their use of the ITN service. Community transport, as seen in the example, can offer a quality alternative to the private vehicle for the elderly and could also assist in providing for the mobility needs of the disabled.

4. KEY SOLUTIONS

Government policies and targets must aim to reduce the impact of meeting mobility needs on quality of life. Targets in areas such as greenhouse gas emission levels, public transport mode share and provision for the disabled, drive programs, initiatives and investments to develop sustainable solutions to providing for mobility needs. However, while it is likely that car and road freight will remain the dominant method of moving people and goods in developed countries, policies need to be developed to target road travel directly, such as policies for road system supply and demand, traffic management, vehicle performance and land planning. To an extent, policies that increase the supply and efficiency of urban public transport are natural complements to direct road travel policies – but they can only be very partial substitutes for them if the aim is to make urban travel easier and cleaner.¹

4.1 Providing Transport Choice

Part of the solution to achieving sustainable transport, is the provision of reasonably and affordable alternatives to the private automobile. Implementing measures that make the way we move people more sustainable requires public acceptance and thus these measures must result in a transport system that provide for people’s needs. Policies and programs are being implemented in many countries to increase the use of walking, cycling, public and community transport and are important measure to drive change and provide better transport choice.

Australian and international research establishes that in addition to the ready availability and frequency of public transport services, the following factors are important for increasing its usage:

- travel time and reliability (on-time running);
- safety and security;
- ease of access, particularly for the aged and disabled;
- seamless connections at modal interchanges, including the location and design of stops; park and ride facilities, etc;
- ‘real time’ traveller information and communication systems; and
- effective road user regulation and compliance systems.

The London Bus Initiative is a major investment program to address the quality of bus services in London. The Initiative aims to deliver a “step-change” enhancement of the actual and perceived quality of London’s bus services, and ultimately attract more people

to the bus.¹⁰ Benchmark standards have been established to provide a consistent, high standard for the whole route as well as the whole journey experience; from the pre-journey information and planning, through travel and access to a bus stop, to the bus stop environment and finally the bus journey itself.

4.2 Managing Road Transport Better

When developing transport solutions, the dominance of road based commercial and private vehicles in moving goods and people both now and in the future has to be considered. Technological changes and innovation in transport systems offer solutions that will have a major impact on every facet of transport in the coming years and can be delivered in the short and long term.

4.2.1 In-Vehicle Technology

In the short to medium term future, it is likely that improved motor vehicle design, low carbon and high energy efficiency vehicle technology will be introduced. Some of the technologies to optimise energy consumption that are deliverable today include new composite body materials, enhanced streamlining, improved road to vehicle interface to reduce resistance and advanced engine and transmission systems, such as electric and hybrid vehicles. Alternative fuels such as the introduction of ethanol, methanol hydrogen and biogas have the possibility of reducing the polluting emissions of petrol. A new flexible-fuel vehicle that will automatically detect fuel type and adjust the engine will increase the flexibility and viability of the conventional vehicle. Measures such as improved distribution networks for alternative fuels and mass engine conversion to dual fuel can be achieved through planning and policy.

In-car technology such as advanced-warning and crash-avoidance systems, enhanced emergency response, improved navigational systems, and vehicle safety equipment have the potential to improve safety. The reduction of casualty crashes using such technology is estimated by PIARC Committee 16 to be in the range of 20 to 40 percent. However, it is also argued that the transfer of private information, the mobile office and television into the car is problematic due to the high mental and sensory distraction to the driver.¹¹ The challenge is to ensure that improvements to in-car quality time will not adversely impact safety. Discussions at the 21st PIARC Congress clearly indicated that safety should be paramount and deployment of in-car technology should be managed with appropriate worldwide standards and not left to market forces.

In the longer term, fundamentally new transport technologies may emerge which do have the potential to transform the system such as futuristic vehicles that fly or hover. However, it is unlikely that they will appear in any practical form within the next 30 years. For the majority of the next 30 years, urban transport is likely to be dominated by a car road system with incrementally improved efficiency. In-vehicle car technological improvements do not promise to transform the transport system but will continue to evolve and assist in reducing the impact of motor vehicles on the environment and in improving transport efficiency and safety.

4.2.2 Innovation in Transport Systems

In the short to medium term future the management of traffic and travel demand is expected to be significantly more efficient through the use of advanced information technologies. These measures will greatly increase the scope for efficient traffic management (through advanced signaling and traffic simulation systems), will make road pricing more feasible and provide advance traveller information and driver assistance.

In the medium to long term future, Intelligent Vehicle Highway Systems (IVHS) and Intelligent Transport Systems (ITS) are systems that will apply information, communication and control technologies to help the operation of transport networks. Through improvement of operations, such intelligent transport tools are being deployed now and will continue into the future to save lives and time, to enhance the quality of life and the environment, improve the productivity of commercial activities and encourage the use of public transport. The use of advanced traveller information (ATM) to provide information on travel time and incidents by monitoring traffic remotely is another tool to dynamically alter traffic flows to optimise traffic operation and safety. Such innovations have the greatest potential to facilitate a monumental change in traffic management to achieve sustainable transport objectives of the future.

4.2.3 Demand Management

A fundamental consideration that must be retained is that transport is primarily a derived demand. Transport of both people and goods takes place so that people can benefit from the access it provides to work, recreation, education or to a range of services and goods; all of which affect quality of life.

Telephone and internet shopping, teleworking, telecommuting, working from home, tele-education and tele-conferencing are all virtual substitutes for transport. The development of virtual transport substitutes is occurring at a rapid rate and it would be expected that with increasing use of technology in society more, people will make use of this new way of shopping, working and studying.

4.2.4 Road Pricing

Electronic road pricing is increasingly being seen as a demand management tool to discourage congestion in sensitive corridors. More than 20 countries around the world are installing automated tolling equipment following the lead of Singapore and more recently some Norwegian cities. The problem of vehicles diverting away from tolled routes and impacting on minor roads can be overcome with an area wide system that charges rates that vary according to the time of day and degree of congestion using global positioning systems (GPS) as proposed in America.

4.2.5 New Transport Plan

An innovative proposal by the authors of this essay relates to the implementation of a "Transport Plan". The Transport Plan would provide a user-pays system for all modes of transport and could be part of an electronic "SmartCard" account linked to the banking system. Like purchasing mobile telephone plans today, the user would be able to purchase a transport plan that is appropriate to their needs. Using the transport system in periods of high demand would cost more, as mobile telephone calls in peak periods do today. Prices could be set to reflect the overall infrastructure, maintenance, congestion and environmental cost of the chosen mode, location and time of travel. All other taxes and charges related to transport, such as fuel excises, registration fees and public transport tickets, would be removed to provide one comprehensive and clear payment system. This will allow the user to make more informed choices about how and when they travel and to evaluate and rationalize their travel requirements into a plan that suits their needs. This would still provide users with a choice of travel modes, noting that viable and efficient alternatives to the car would be required, however, rather than users continuing to use a travel mode and pattern simply because it was how they always travelled, they would be required to regularly assess their mode of travel. This scheme would also assist transport

managers in ensuring that the system was not overloaded, but rather operated in a balanced manner.

5. FUTURE VISION

2030

David, now a mature, 60 something semi-retired transport professional, comfortably leans back into the seat of the mass transporter as he departs his quiet neighbourhood surrounds for his twice weekly journey into work.

Times have changed. David is now safely and comfortably catching up with the news of the day and the real-time travel information displayed in front of him. He can also check the credit balance on his Transport Plan Card and prioritise his activities for the day.

As the mass transporter glides into the next stop, he glances out the window, and as usual his now 37 year old daughter, is waiting to join him on her trip to work. He thoroughly enjoys catching up with her each morning, as it is difficult to normally meet, given her hectic lifestyle with 5 kids and a full time job.

Time spent in traffic now is no longer dead time, it is now quality time.

As the convoy of mass transporters move along the Intelligent Transport Way, he glances out onto the balanced flow of vehicles, and explains to his daughter how congested roads were 30 years ago. She looks at him with little interest as she can barely remember vehicles queuing on the former motorway for 20km. These days, Intelligent Transport Ways provide controlled transport for all travel modes; including mass transporters and private and freight movers, ensuring congestion did not occur.

Mass transporters provide armchair type rides, without the stress of driving, and fast access to the main activity centres. There are also frequent and well connected local transporters to the Intelligent Transport Way. David momentarily glances back to his monitor that displays the real-time travel and location map, travel times for interconnecting routes and the daily air quality indicators.

He looks out at the vast number of freight movers and electric powered delivery vans that now quietly and efficiently dart all across the city with little delay. These days the trucks are quieter, faster, safer, less costly and better meet the needs of the community with less impact on the environment.

David visited the city of his childhood earlier that year. Increased economic wealth, government stability, health and education have provided an enormous improvement to the quality of life in what was once termed a “developing country”. Improved road networks, public transport systems and legislation and enforcement of road safety measures and vehicle standards have all assisted in providing a more accessible, efficient and safe transport system and better environment for the city.

The mass transporter glides into another stop, positioned outside a café and other conveniences. David farewells his daughter and commences his short walk to his workplace. He contemplates with a smile the ease of his travel to work and how the younger generation don't know how good they have it!

It gives him satisfaction to know that he has played a small but significant part in improving the quality of life of the city's community through providing sustainable transport solutions.

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