

# Sustainable Transportation in New Zealand

*One of a number of discussion papers produced by the IPENZ Presidential Task Committee on Sustainability during 2003 and 2004.*

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## 1. Summary

Sustainable transportation is an appropriate goal for New Zealand and its engineering community. Sustainability means meeting today's needs without compromising the needs of future generations. This will have implications for the way we travel and the shape of our communities in New Zealand.

An increased focus on managing demand for motor vehicle transportation will be necessary, as opposed to traditional approaches to predict future trip demand based on historical growth trends and to then attempt to provide road capacity. As has been increasingly appreciated overseas, it will be futile in New Zealand to attempt to build our way out of congestion. Traffic expands to fill the available road capacity. In the not-too-distant future, a variety of techniques will be needed to manage traffic demand, including stronger land use planning to deter urban sprawl, congestion pricing and other road tolling techniques, parking supply management and pricing, fuel pricing and high occupancy vehicle lanes. These changes, some of which have already occurred, will encourage us to make the necessary changes in lifestyle and travel behaviour.

Currently, transportation generates about 40% of our carbon dioxide (CO<sub>2</sub>) emissions, or 15% of all greenhouse gas (GHG) emissions. Transportation emissions are also the fastest growing source of GHG emissions in New Zealand. Air pollution from the motor vehicle fleet is also increasingly unsustainable.

A number of recent policy initiatives confirm that it is the government's intention that we as a nation become more sustainable in transportation. These initiatives include the New Zealand Transport Strategy (2002), the signing of the Kyoto Protocol (2002) and the Land Transport Management Act (2003).

Most western countries and their engineering communities have begun developing sustainable transportation policies and initiatives, including Australia, Canada and many countries in western Europe.

There are a number of ways in which engineers and the engineering community can move New Zealand towards sustainability in transportation. A checklist is included at the end of this paper as an aid for transportation practitioners and engineers in general towards achieving this goal.

## 2. Definitions of Sustainable Transportation

Sustainable development has been defined by the **Brundtland Commission**<sup>1</sup> as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Accordingly, sustainable transportation can be thought of as transportation systems that meet the needs of the present without compromising the ability of future generations to meet their own transport needs.

The Organisation for Economic Co-operation and Development (OECD) in a 2002 report entitled **OECD Guidelines towards Environmentally Sustainable Transport** noted that<sup>2</sup>:

“A sustainable transport system is one that throughout its full life-cycle operation:

1. allows generally accepted objectives for health and environmental quality to be met, for example, those concerning air pollutants and noise proposed by the World Health Organization (WHO);
2. is consistent with ecosystem integrity, for example, it does not contribute to exceedence of critical loads and levels as defined by WHO for acidification, eutrophication and ground level ozone; and
3. does not result in worsening of adverse global phenomena such as climate change and stratospheric ozone depletion”

The **Centre for Sustainable Transportation**<sup>3</sup> (in Canada) defines sustainable transportation more widely as:

“A sustainable transportation system is one that:

- allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- limits emissions and waste within the planet’s ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.”

This definition differs from the OECD definition in that it recognises the social, cultural, economic and environmental aspects of sustainability inherent in the Brundtland Commission definition. The OECD definition relates to a rather narrower concept, environmental sustainability.

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<sup>1</sup> The World Commission on Environment and Development (Brundtland Commission) 1987

<sup>2</sup> <http://www1.oecd.org/publications/e-book/9702191E.PDF>

<sup>3</sup> <http://www.cstctd.org/CSTadobefiles/Definition%20Vision%20English%20Oct%202002.pdf>

### 3. New Zealand Aspects of Sustainable Transportation

**Greenhouse gas emissions** from transportation are just one aspect of sustainability, but they provide a useful indicator of New Zealand's sustainability (or otherwise) in transport. Motor vehicle use is New Zealand's fastest growing and to date least controllable major source of greenhouse gas (GHG) emissions. Road motor vehicles produce over 11 million tonnes of carbon dioxide (CO<sub>2</sub>) annually, about 40% of our carbon dioxide emissions and 15% of our GHG emissions<sup>4</sup>.

After enteric fermentation (methane emissions from domestic livestock), land transport is the largest source of GHG emissions in New Zealand. It is also the fastest growing, accounting for 18% of the growth of GHG emissions over the 1990 – 2001 period. Thus nationally, road transport should be a significant focus in New Zealand's efforts to become more sustainable.

Aviation, by comparison, contributes only 1% of GHG emissions and 1.5% of the growth. Nevertheless, air travel still produces many times more GHG emissions per person kilometre of travel than cars, and is thus much less sustainable than car travel on a per person kilometre basis.

In November 2003 the **Land Transport Management Act (LTMA)** was passed. It attempts to provide a more balanced approach to land transport projects, and places increased emphasis on multi-modal transportation systems and solutions.

New objectives for Transfund New Zealand (Transfund) and Transit New Zealand (Transit) are to allocate resources, and operate the state highway system, to achieve an "integrated, safe, responsive and **sustainable** land transport system".

To further enhance a long-term and strategic focus, Transfund and organisations approved to get funding from Transfund, including Transit, will be required to prepare ten-year financial forecasts. The LTMA enables the Minister to give Transfund and Transit annual instructions relating to the government's priorities for land transport funding.

The LTMA allows regional councils to fund, and both own and operate, public transport infrastructure and services unless prohibited by Order-in-Council. Future work will look to make it easier for public road controlling authorities to work together. The LTMA also modifies the purpose of Regional Land Transport Strategies, which set out an integrated approach to managing land transport in each region, to be consistent with achieving a land transport system that is integrated, safe, responsive and sustainable.

The **New Zealand Transport Strategy**<sup>5</sup> (December 2002) also moves New Zealand in the direction of sustainability in transportation. This strategy outlines the government's vision for transport: that New Zealand has an affordable, integrated, safe, responsive, and sustainable transport system. The strategy also notes that:

"Economic development, social cohesion and environmental improvements must be progressed in parallel. Transport decisions will need to reflect the wider government commitment to sustainability.

"To ensure that transport is underpinned by the principles of sustainability and integration, transport policy will need to focus on improving the transport system in ways that enhance economic, social

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<sup>4</sup> New Zealand Climate Change Office (2003) **Climate Change – National Inventory Report New Zealand**, Wellington, pp 3-4. <http://www.climatechange.govt.nz/resources/reports/nir-apr03/nir-apr03.pdf>

<sup>5</sup> <http://www.beehive.govt.nz/nzts/home.cfm>

and environmental well-being, and that promote resilience and flexibility. It will also need to take account of the needs of future generations, and be guided by medium- and long-term costs and benefits."

The **Ministry of Transport's Statement of Intent**<sup>6</sup> 2003 – 2004 (May 2003) states:

"Sustainable Transport is the Ministry's vision. As the government's principal transport advisor, we will continue to identify solutions with longer-term benefits. Decisions will be based not only on monetary costs and benefits, but will also take into account the social, regional, economic, health and environmental impacts of all projects."

New Zealand ratified the **Kyoto Protocol** on 19 December 2002, confirming its commitment to managing greenhouse gas emissions. The New Zealand Climate Change Office<sup>7</sup> identifies the following issues under the Transport theme:

"The number of vehicles in New Zealand is increasing rapidly. Since 1960 the number of registered vehicles has more than trebled. About 40% of our carbon dioxide emissions come from transport – mostly private cars – and transport is one of the biggest growth areas of New Zealand's greenhouse gas emissions. These emissions are causing Earth to warm at an unprecedented rate and the climate to change.

"The New Zealand Transport Strategy defines the Government's vision of an affordable, integrated, safe, responsive, and sustainable transport system by 2010. One of its aims is to ensure environmental sustainability – policies will encourage usage of more energy efficient modes of transport and contribute to reducing greenhouse gas emissions from the transport sector.

"We have come to rely on cars as a quick and convenient way of getting from place to place, but we need to reduce the number of cars on the road. Ways to do this include:

- Use public transport and walk or cycle more often.
- Car pool when possible.
- Do you really need that second car? Consider upgrading your bicycle instead.
- Set concrete goals at home and at work for reducing your travel.
- Choose a place to live where you can drive less.
- Consider telecommuting and video conferencing as options to reduce the need to travel.
- Make use of a Walking School Bus<sup>8</sup> if available in your area."

According to **Getting there – on foot, by cycle**<sup>9</sup>, quoting the New Zealand Travel Survey (1997/98):

- "Thirty percent of trips undertaken by mechanised transport (private motor vehicles, public transport, and bicycles) are for distances of under two kilometres.
- Sixty percent of trips are under five kilometres in length."

There is clearly scope for some of these trips to be undertaken by more sustainable modes of transportation.

<sup>6</sup> [http://www.transport.govt.nz/publications/soi\\_0304/index.shtml](http://www.transport.govt.nz/publications/soi_0304/index.shtml)

<sup>7</sup> <http://www.climatechange.govt.nz/>

<sup>8</sup> [http://www.eeca.govt.nz/default2.asp?target=content%2FTransport%2Ftransport\\_wsb.htm](http://www.eeca.govt.nz/default2.asp?target=content%2FTransport%2Ftransport_wsb.htm)

<sup>9</sup> The draft New Zealand Walking and Cycling Strategy (October 2003):

<http://www.transport.govt.nz/business/land/getting-there/index.shtml>

## 4. Overseas Perspectives

In **Western Australia**, the government is developing a sustainability code of practice for government agencies and their employees. Amongst other things, it recognises the significance of transportation in the sustainability debate:

“Agencies shall ensure that ... the number of vehicles are minimised, vehicle use is reduced, fuel efficiency is maximised and travel alternatives are promoted.”

There has been considerable sustainable transportation policy development work done in the **United Kingdom** including work on “travel plans” for schools and businesses, for example. The National TravelWise® Association (NTWA)<sup>10</sup> is “a partnership of local authorities and other organisations working together to promote sustainable transport”. “Car share” schemes are increasingly common in the UK and Europe, where cars are communally owned and rented by the hour or day as necessary by members of the group. In this way, typically ten people own a car. (In New Zealand, ten people on average own five cars.)

In London, a congestion charging programme was introduced in February 2003 in a major initiative to combat traffic congestion. The scheme, which is widely regarded as being highly successful, charges motorists £5 per day to enter or park on a street in the central part of London. The area covered by the scheme is 22 square kilometres. For comparison, Auckland City (part of the greater Auckland metropolitan area) has an area of 60 square kilometres and a population of about 400,000 people (making it New Zealand’s fourth most populous city).

From the **United States of America**, “Natural Capitalism” (written by Paul Hawken, Amory Lovins and Hunter Lovins and published by the Rocky Mountain Institute in 1999) devotes a chapter to transportation<sup>11</sup>, noting that:

“A fleet of 200 mpg, roomy, clean, safe, recyclable, renewably fueled cars might keep drivers from running out of oil, climate, or clean air, but they’d instead run out of roads, land, and patience—the new constraints *du jour*. Many of the social costs of driving have less to do with fuel use than with congestion, traffic delays, accidents, roadway damage, land use, and other side effects of driving itself. Those social costs approach a trillion dollars a year—about an eighth of America’s gross domestic product. Because that figure is not reflected in drivers’ direct costs, the expenses are in effect subsidized by everyone.”

In the USA, many agencies are using the “parking cash out” system. Employers that offer free or subsidised parking to employees can implement parking cash out. Under a parking cash out programme, an employer gives employees the choice of keeping a parking space at work, or accepting a cash payment and giving up the parking space.

High occupancy vehicle (HOV) lanes (where lanes on motorways or arterial roads are reserved for use by buses and cars with three or more people) are also in widespread use in the States and Canada. Variants of this such as high occupancy toll (HOT) lanes (where not only are the lanes reserved for these vehicles but users also pay for the use of the lane) are also in use.

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<sup>10</sup> <http://www.travelwise.org.uk/index.shtml>

<sup>11</sup> <http://www.natcap.org/images/other/NCchapter2.pdf>

The **Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)** has developed a Primer on Sustainability<sup>12</sup> to raise knowledge of sustainability amongst its members. One section of this is devoted to sustainable transportation. It is a very comprehensive piece of work (over 40 pages) and is recommended as background reading for New Zealand engineers and others interested in sustainable transportation.

The Centre for Sustainable Transportation has developed a **Vision for Sustainable Transportation in 2035** as follows:

***“Focus on access.*** In a society in which transportation is sustainable, people have at least as much access to goods, services, and social opportunities as they have today, particularly people who are economically disadvantaged or who face unusual physical challenges. But the ways in which this access is achieved may be quite different.

***“Non-motorized transportation.*** Much more of the access depends on widespread use of nonmotorized means of transport for persons, particularly in urban areas. This is possible because living and working arrangements have become much more compact. Walking, bicycling, rollerblading, and other non-motorized modes have become much more acceptable and agreeable.

***“Motorized transportation by current means.*** Some access depends on motorized transportation systems that are similar to those of the early 2000’s but use very much less energy and pollute much less. There is more public transport, because it is encouraged by the layout and design of urban regions and because owning and using a car costs much more.

***“Motorized transportation by potential means.*** Some access depends on the use of quite different technologies from those in common use today. They might include fuel cells using renewable resources such as hydrogen produced with solar energy, intelligent transportation systems, automated highways, maglev rail services, and airship technologies. Together they provide cleaner, more conserving, and safer movement of people and goods.

***“Movement of goods.*** The movement of goods utilizes modes of transport appropriate to the size and distance of shipment and to the minimization of resulting emissions. Shippers and carriers include environmental as well as financial goals in selecting the timing and mode of shipping.

***“Less need for movement of people and goods.*** Whatever the mode, journeys made by motorized transport are shorter on average than in early 2000’s, for the movement of both people and goods in part because urban areas are more compact and have a good mix of uses. More access is achieved through telecommunications, with less movement of people or goods.

***“Little or no impact on the environment and on human health.*** The net result is dramatically lower local and global impacts of transportation on the environment. The impacts are so low they no longer provide reason for concern about people’s health or any part of the natural environment, in the present or the future. In particular, emissions of carbon dioxide and other greenhouse gases from transportation are less than one fifth of the total of such emissions in the 1990s.

***“Methods of attaining and sustaining the vision.*** As well as changes in urban areas that facilitate collective transportation, bicycling, and walking, there has been and continues to be rigorous application of the full costs of transportation, supported by appropriate incentives and also by enforcement of standards for vehicles, fuels, and infrastructure.

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<sup>12</sup> <http://www.sustainability.ca/index.cfm?Mid=481>

***“Non-urban areas:*** While the opportunities for achieving sustainable transportation in rural areas may be different and perhaps more limited when compared to urban areas, Canadians living in rural areas can make a positive contribution towards transportation sustainability.

***“Date of attainment:*** Achieving the level of sustainability in transportation described above is believed to be achievable by about 2035. This does not preclude the possibility that much or all of transportation could be sustainable at an earlier date. In any case, setting and meeting performance milestones in the short and mid-term will be essential parts of the attainment of sustainable transportation in the longer term.”

## 5. Implications for IPENZ Members and Engineers in General

The policy framework is now in place for sustainable transportation to be implemented in New Zealand. Engineers have many opportunities to be involved in this process. They also have professional responsibilities to do so, as noted, for example, in the **IPENZ Code of Ethics**:

“Members shall be committed to the need for sustainable management of the planet’s resources and seek to minimise adverse environmental impacts of their engineering works or applications of technology for both present and future generations.”

Members of IPENZ and of its Transportation Group, and others engaged in transportation generally, are encouraged to learn what they can about sustainable transportation and apply it in their day-to-day actions at work and in other aspects of their lives. Much information is already available both from New Zealand and internationally. The engineering and transportation professions should lead the way and be seen to lead the way towards a more sustainable transportation future.

There a number of ways in which engineers and the engineering community can move New Zealand towards transport sustainability. The following checklist draws heavily on the work of the APEGBC, for which acknowledgement and appreciation are given.

## 6. Sustainable Transportation Checklist

1. Have you taken all reasonable steps within the scope of the project to reduce or manage demand for motor vehicle use, rather than “predicting and providing”?
2. Can you support official commitment to alternative modes of transportation and mixed use development at the leadership or policy level?
3. Can you use the success of other municipalities or public agencies to educate or inform a council or agency about sustainable transportation?
4. Can you use your knowledge of sustainable transportation to educate and suggest alternatives (e.g. traffic calming and walking school buses near schools are safety issues as well as sustainable transportation issues)?
5. Can you use your knowledge of transportation’s link with land use to support service to alternative modes?
6. Can you quantify and apply the real costs of car dependency to your project?
7. Can you monitor key performance indicators for transportation sustainability?
8. Can you purchase local materials instead of importing from other parts of New Zealand or overseas?
9. Can you co-ordinate shipping or freight (e.g. bringing in trucks with solid waste and leaving with gravel)?
10. Can you amend subdivision, engineering or zoning regulations to support alternative modes of development that are more sustainable for transportation?
11. Can you set targets for minimising parking and impermeable surfaces in new developments?
12. Can you support or initiate internal trip-reduction programs in the workplace?
13. Can you lead by example by walking, cycling or taking public transport for some trips?
14. Can you use telephone conference calls instead of face to face meetings requiring extensive land or air travel for some meetings?