

# Sustainable Living Programme 2008 Edition

## Our Travel Habits – an introduction



The many attractions of **access to private transport** from home, such as a motor car, include:

- fast travel time, door to door (except at peak congestion time)
- no waiting periods to start journey, no transfers required, can 'do more tasks per hour' (not central city?)
- convenience and independence of not being tied to others' timetables
- travel at own choice of speed and stop when/where you wish on longer trips between towns
- once vehicle is purchased, NZ fuel costs to run a car are fairly low, as low tax on fuel (no carbon charge)
- reliability, if well-maintained car
- protection from the weather (although rain, ice and fog do present driving hazards)
- space and strength to carry loads
- clean, mostly comfortable
- place to play favourite music
- source of social status, especially if you can afford a new/large car
- perceived as safer than walking for lone travellers (from potential attack, if not from road accidents).

*Which of these aspects are most important for you?*

For those with regular income, car use is affordable and very popular. However, mass car use brings with it real costs, both for the planet and for society. Most of the benefits and some costs are felt by the owner-users, whilst many other costs affect all the population, including non-car users and the natural environment. What costs are these?

These notes first catalogue **10 'costs' of the car:**

### 1. Car use dominates our cities

New Zealanders own a lot of motor vehicles, over sixty of them for each 100 of the population. Two-thirds of the workforce drives to work.

New Zealanders have one of the highest vehicle ownership rates in the world. Our population of 4.2 million people owns 3.3 million vehicles. Eighty per cent of all road travel is by car. Between 1990 and 1999 our vehicle fleet grew by 26%, and between 2001 and 2003 by 9%.

Christchurch, for example, became progressively more car dominated from the 1980s to 2001. Car use rose from 67% to 77% of these trips, whilst cycle use fell from 11% to 7% and bus use to 4%, but rose since. Walking the whole journey to work hovered at 5%, while motorbike use, already low, fell to 1%.

A road lane, typically 3 to 4 metres wide, can accommodate 1,800 people per hour in vehicles, or over 8,000 in buses and coaches, or 13,000 on cycles. The roads would be less congested and driving less stressful if a larger proportion of travellers used buses or cycled.

**Myth:** We need more motorways to reduce congestion and get cars off city streets.

**Reality:** Sydney's M4 motorway resulted in a significant drop in use of the parallel railway line and an increase in vehicle movements of 18,000 a day. Far from reducing traffic congestion in the city, there were up to 24,000 more vehicle movements closer to the city centre than before. (Source: Sydney Morning Herald, September 12, 2005.)

Ecan (Canterbury Regional Council) and the Christchurch City Council from trends, predict traffic growth of 40-50% over the next 15 years, turning suburban streets into hard-to-cross 'arterials', increasing noise and air pollution, and slowing traffic to a 20km/hr crawl at bottlenecks such as traffic light junctions and river bridges. This growth may be moderated by rising fuel costs, LTNZ suggests<sup>1</sup> Total vehicle kms travelled in NZ peaked in 2005 at nearly 40 billion and fell slightly in 2006.

**Most of the day our cars are not moving.** They need parking spaces or garages, at a cost to the user or their employer. Parking spaces for workplaces and the same area again at home, plus roadways, are covering green-space with bitumen tar-seal and concrete at an alarming pace. For example by 2000, 18% of urban Christchurch land area was vehicle-related roads or parking.

The bus routes in most NZ cities are radial, from housing areas on the outskirts to offices, shops and facilities in the city centre. During the 1990s, bus use into city centres rose slightly, but car use rose faster. Meanwhile many workplaces and retail areas developed around the margins of the city, away from these bus routes – so access to these had to be by car or cycle.

A bold experiment by Environment Canterbury to subsidise and promote a circular bus route serving these malls, called *The Orbiter*. It has encouraged people to use cars less. This \$2.50-cash

<sup>1</sup> A study for Land Transport NZ (report 331) showed traffic reduction 0.35% associated with each 1.0% rise in fuel price. In 2007-8 petrol has risen 23% in price, compared to foods up 6%, but roads still look congested!

fare one hour circuit (\$1.90 using the Metrocard 'electronic purse'), with distinctive lime-green buses at 10 minute intervals, links six Christchurch suburban shopping malls, the University of Canterbury, a hospital, sports centre, swimming pools and other facilities. It has attracted 50,000 passengers a month, representing a large reduction in car trips! The Metrostar, which crosses the same city in a northern arc and also avoids the centre, has proved similarly successful since its introduction in 2004.

Christchurch has comparable average bus patronage to similar sized cities in Australia (Canberra and Hobart) and Candada (Halifax). Residents of UK cities Cardiff, Hull and Aberdeen, on the other hand, average three times this, at 120 trips/person a year.

*Q: How often have you used a bus, train or coach to travel in the past year?*

A:  Trips/yr

### 2. Real costs for the owner

As much as 20% of a typical New Zealand household's income may be spent on transport, mostly on car ownership and use, and on average it's two cars per working household. **NZ has the 5<sup>th</sup> highest car-ownership levels in the OECD developed countries, not far behind the USA.**

Back in 2001 the New Zealand Automobile Association calculated the real cost of owning a low-km family-size three-to-four-year old car at over \$20 per day. Its calculation assumed you had to borrow the money to buy it, so it included finance costs and 20%/yr depreciation in value as well as tax and insurance. **That adds up to \$140 a week to own a car, before you put in fuel**, or cover the costs of parking, providing a garage, cleaning and any extra gadgets or tools. A

much older car that's fully-paid would have lower 'cost of ownership'.<sup>2</sup>

**You need to add running costs per km to the cost of ownership** (the NZ Automobile Association researches these each year for members, see: <http://www.aa.co.nz/motoring/owning/running-costs/car/Pages/default.aspx> and takes into account the engine oil, filters, replacement tyres, petrol, routine maintenance, parts and workshop repairs. If the average annual distance travelled is 12,000km, the total cost of owning and running a 4 year old car (in the range 1600cc to 2000cc petrol engine), was over **\$10,000 per year in total**. Higher fuel costs are raising this.

For a smaller car (1300cc), the cost was several thousand dollars lower. The figure **per km** for overhead costs is of course higher if you drive only a small annual distance.

Q: *what is your car's engine capacity?*

A:  CC

An older costs less to purchase, because it has already depreciated much of its original value, but it usually costs more per km to maintain.

Q: *How far does your car travel on average each year? (if you don't have any other records, divide the km travelled since you bought it – see odometer reading on original vehicle registration certificate, compared to now - by the no of years owned.)*

A:  Km/yr

<sup>2</sup> To help you calculate your car running costs you can work out the cheapest options by visiting: [www.qosmarter.org.nz/journevest.asp](http://www.qosmarter.org.nz/journevest.asp) or <http://www.fuelsaver.govt.nz> - site providing information about fuel consumption of vehicles available on the New Zealand market. How much do you spend on fuel?

### 3. NZ mostly imports older, less-efficient cars, not newest technology

*Fuel efficiency has become important when choosing a vehicle.*

Q: *Are you expecting to change your car before 2007?*

A: Yes or No

Cars are no longer constructed here in NZ in significant numbers. Many are already well-worn and inefficient when they are imported (average age of import 8.2 yrs in 2006) and thus will need more maintenance. Only 17% of cars on the road are under four years old. The relatively few new vehicles tend to be bought by companies to run at high annual km, not private households. Environment-friendly, fuel-efficient technologies such as 'hybrid' petrol/electric cars, already in use in Japan (from Honda and Toyota), and European low-fuel consumption diesels are still rare here.

81% are petrol fuelled, 19% diesel. Government proposed then deferred introducing carbon charges or taxes as a financial disincentive to burn fossil fuels (because of transport's contribution to global warming). The global "peak" in oil production will also have a big impact, as demand exceeding supply will push up prices considerably in a sellers' market. We're not running out of oil yet, only cheap oil.

From January 2008, only petrol cars newer than 1998 are be allowed in and the following year no car older than 2000 manufacture will get in. Diesels will have to be no older than 2002. Currently there are 2.6 million vehicles on NZ roads, with an average age of 12.4 years (up from 11.9 in 2000).

### 4. Constructing roads, bridges and car parking space costs us dearly in rates and taxes

There is huge annual 'public investment' in creating and repairing road space and parking facilities, which are not expected to provide a financial return (as a toll road would). On the other hand, the much smaller sums of public money spent annually on public transport are usually referred to as 'subsidy', and the user pays-as-they-go for public transport costs. Road surfaces are not, yet, priced directly to the user in relation to their kilometres travelled<sup>3</sup> or damage from axle weight.

**Myth:** Every other country in the world designs their cities around the motorcar. Why should we try to change the world?

**Reality:** European cities are now designing for the post-auto age. London's bid for the 2012 Olympics included an undertaking for it to be the first sustainable, car-free games. Cars will not be permitted in the Olympic Village or the three main venues. Instead, the half-a-million spectators are expected to travel by bus, train, underground or bicycle. The city's planners have a £10 billion programme to upgrade public transport and to double the number of cycle tracks in the city, in time for the Olympics. (Source: UK Sunday Times August 28, 2005.) The Congestion Charge, levied when drivers enter the London city centre, has already had a marked impact on urban fumes, noise and traffic flows.

### 5. Car dependency in city suburbs: is it a state of mind?

Because city workplaces, housing, schools, shops and other facilities tend to be separated from each other, the distance between all the places we seek out appears to have grown beyond our willingness, or available time, to walk.

<sup>3</sup> Note that public work on local roads is funded through rates by the city or district councils and funding from taxpayers through Land Transport NZ. (Transit covers State highways) The Regional Council supports public transport service in operation, and the City Council funds infrastructure such as bus shelters and bus lanes. Unitary authorities combine these roles.

These days if a destination is more than five minutes walk away New Zealanders appear to be ready to use the car – even to post a letter or pick up milk from a dairy! One third of vehicle journeys in NZ are under 5km, and 11% under 2km.<sup>4</sup> Furthermore, the vast majority of vehicle trips are made with just one person in the car – in Hamilton's case, a stunning 94.7 % according to the 2001 census.

To have no car access when living in scattered city suburbs is to 'feel handicapped' compared to life in the compact small town (or perhaps in apartments within the inner city), where residents have all that they need day-to-day within walking or cycling distance. Some argue that a clearer sense of place and being connected, or confident with where you live, emerges in the process of getting to know a neighbourhood on foot, by cycle and by bus. Walkers see, hear and interact with people far more than a car driver or car passenger can do.

Q: *Where could or do you walk, to get from your house to shops?*

A:  I can walk to:  
 How long does it take to get there?

**Bus services may have improved since you last experienced a bus ride!** Auckland's MAXX website [www.maxx.co.nz](http://www.maxx.co.nz) has a Journey Planner to enable you to find the fastest and cheapest way to get to your destination. Other centres are using similar software e.g. [www.metroinfo.org.nz](http://www.metroinfo.org.nz) in Christchurch. In Wellington use Metlink: [www.metlink.org.nz](http://www.metlink.org.nz)

<sup>4</sup> Journey length refers to all motorised travel (vehicles include buses, also taxis, private cars, motorcycles and trucks. It doesn't include cyclists, pedestrians or pedestrian scooters/ wheelchairs). The reason for this split was to indicate the estimated proportion of motorised travel (in 1998) undertaken over a distance suitable for cycling (5km) and for easy walking (2km).

Q: If you live in a city, find out how far the nearest bus routes & stops are from your home. (Probably under 500metres)

A: The first route number:  
Where this bus stops:  
Walking time from home?

An alternative route number:  
Where this bus stops:  
Walking time from home?

Once a choice is made to travel by car, the places that we can park at most easily, free or cheaply (such as suburban shopping malls, or out-of-town warehouse sheds, or sports centres) may attract our return visits, rather than the shops or services on streets *actually nearer to home*. We may ignore, by car, some smaller businesses located on busy roads, that may have high quality goods or friendly staff, shops that we could have reached on foot, by cycle or bus.

Suburban life habits become 'car-dependent' if no alternative ways to travel are experienced.

**6. Cars are resource-hungry to build, and wasteful again once 'scrapped'**

By the 1990s, 48 million cars were being built each year, world-wide. About 26 tonnes of minerals and waste materials are 'processed' to provide the metals and plastics used to make each car of under a tonne in weight. Large amounts of energy and water are also required in vehicle manufacture, so that **the energy and resource impact of all stages of manufacture is at least equivalent to the car's impact once it's in use.**

The typical age of cars when scrapped in NZ is from 14 to 20 years.

Western Europe, USA and Japan, put together, scrap 38 million cars a year.

Each scrapped car represents, on average<sup>5</sup>:

- three tyres dumped (and one re-treaded)
- three litres of sulphuric acid in the battery, plus toxic lead battery plates<sup>6</sup>
- three litres of petrol left in the fuel tank, plus engine and gearbox oils, if not drained and recovered
- five litres of cooling liquid (containing antifreeze chemicals) ready to pollute groundwater
- refrigerant chemicals from air conditioner (in older cars, contained ozone-damaging CFCs)
- many un-recyclable mixed plastics including PVC (Note toxic dioxins are released if PVC burned)
- steel, copper, chrome and aluminium
- laminated glass from car windows (which is not easy to recycle).

**7. Running a car is resource-inefficient**

In addition to taking up more space than other road users, per person, today's vehicles use energy inefficiently, compared with other modes of travel, typically using a litre of fuel for every 9 to 12km travelled. The majority of NZ oil imports (we import 12.1 barrels of oil per person per year)<sup>7</sup> are used for vehicle fuels and lubricants. This was 40% of NZ's energy consumption by 1998 and is a growing proportion annually. The absolute growth in energy consumption in NZ has been 1.7% each year since 1990. Even after 2007-8 price rises, fuel is relatively

<sup>5</sup> Only in very recent years have cars been designed that are capable of easy disassembly after use, for example because they do not have as many types of plastic (and those plastics they do use are coded). <http://www.co-design.co.uk/green.htm>

<sup>6</sup> 90% of used NZ car batteries get recycled by a firm based in Wellington; that's 600,000 a year.

<sup>7</sup> NZ import levels of 12.1 barrels per person compare to 10.26 in UK, 17.9 in Japan and 26.4 in USA, as the most oil-hungry nation.

cheap here, compared to Europe, where it is much more highly taxed.

Globally we are 'hooked on oil'. Pressure to keep up the supply of cheap oil leads to exploration and production by multi-national corporations in many parts of the world, especially in the conflict-torn Middle East. Oil spills from ships pollute the oceans.



Oil tanker near coast: pollution hazard.

In terms of energy efficiency, the carbohydrate 'fuel' used by a cyclist (e.g. some slices of toast, or bowl of breakfast cereal) is converted to more kilometres of travel than their equivalent energy in petrol used in a car. A car needs 1153 calories per km, the cyclist only 22 calories per km. A full bus is between 3 and 5 times more efficient per passenger than a car with one driver, but bus travel is still 10 times less energy-efficient than bike.

**It's interesting to note that when a car is driven with just one traveller, 95% of the fuel energy is being used to move the vehicle weight and just 5% to move the weight of its passenger.**

A car with four passengers is roughly equivalent in energy efficiency terms to bus transport, which has led to the rule overseas that only multiple-occupancy cars or vans are allowed to share some city bus lanes.

Q: What proportion of your car travel is made with two or more passengers?

A: \_\_\_\_\_ % of trips with 2 or more in our vehicle

The table below allows you to compare some relative energy efficiencies for typical numbers of passengers carried (calculations are from the UK in 1988, so some fuel efficiencies have improved since then.)

Transport type by energy-efficiency (from most down to least)	Energy (MJ) needed per passenger-mile
Bicycle (1 person)	0.1
Walk (1 person)	0.25
Electric suburban train, 60% full of passengers	0.7
Inter-city diesel trains, 60% full	0.77 to 0.95
Express inter-city coach, 65% full	0.61
Single-decker diesel city bus, 33% full	1.4
Motorcycles (1.2 persons)	1.3 to 3.1 range
Small diesel car (1.5 person average.)	2.42
Small petrol car (1.5 person average)	2.79
Large diesel car (1.5 persons)	3.93
Large petrol car (1.5 persons)	4.96

Some new car designs are generally lighter, built with aluminium or fibreglass in place of steel and panels, so that they will not need so much fuel to propel them. Very few of these lightweight, lower-fuel consuming cars have yet reached NZ.

**8. Health effects of driving**

In addition to the exposure to toxic vehicle-exhaust fumes when sitting in traffic queues (invisible gases and tiny suspended particles get concentrated inside the car, exacerbating asthma and lung conditions: see 10 below), the car users are missing out on exercise important for their health.

The human body needs exercise. Muscles waste, bones tend to become brittle (as they lose calcium when you are older unless they carry weight), and the circulation and immune systems become sluggish, contributing

to slow thinking, poor digestion and vulnerability to common infections.

Heart disease has become a major killer in NZ, a contributor to 41% of deaths. The National Heart Foundation lists major 'risk behaviour factors' as: cigarette smoking, raised blood cholesterol, diabetes, obesity and **lack of physical activity**. (These factors act in addition to inherited pre-disposition to heart disease and the relatively greater risk for males and for older people).

Walking 3km in 45 minutes, or an equivalent cross-town cycle ride that raises the pulse rate, three times a week, would qualify as sufficient 'moderate activity' to make a difference to heart health (World Health Organisation guidelines).

For more information see website [www.heartfoundation.org.nz](http://www.heartfoundation.org.nz) or phone National Heart Foundation on 09 571 9191. For exercise activity ideas see [www.pushplay.org.nz](http://www.pushplay.org.nz) and search for the Activator to find out simple ways to exercise; or ask your doctor or practice nurse about a *Green Prescription*. More info from 0800 228483, or also available from Regional Sports Trusts.

Q: When did you last walk more than the length of your street?

A: Date:  
It was for:

For an example of how direct action in the community can produce behavioural change, see Project Lyttelton's *Discover Lyttelton* map <http://www.lyttelton.net.nz/documents/map.pdf> Produced with the help of a grant from Banks Peninsula District Council, the map uses a snakes and ladders concept to make walking around the hilly Christchurch suburb appealing. Since it launched in October 2004, it has resulted in the formation of a walking group, better maintained walkways and a new tourist attraction for the town.

## 9. Cars are physically dangerous to us when moving

Moving vehicles bring safety hazards, not just for drivers and other road users such as cyclists, but also for pedestrians. Injury runs at a high level. 243 people died on NZ roads last year.

The most vulnerable cyclists are the inexperienced young (e.g. they are short, unpredictable, fail to display lights, etc), and the frail old (e.g. may wobble, are not as well sighted or hearing). However, for experienced, fit adult cyclists, this mode of travel is much safer than you may realise.

**Myth:** Cycling is too dangerous.

**Reality:** The injury risks for cyclists are much lower than for some popular sports. Australian research shows a risk of 0.005 per 100 hours of cycling activity. Soccer is 10 times as risky, squash 25 times and rugby nearly 40 times riskier than cycling. And the more people who cycle, the safer it is e.g. a cyclist in Britain is 10 times more likely to be injured than one in Denmark where cycling is more popular and cycleway infrastructure is much more advanced (Guardian, July 2004.)

In cities that use segregated cycle routes and lower urban speed limits than NZ's 50km/hr on shared streets, such encouragement brings out more cyclists. Contrast Auckland's 2% and Christchurch 7% of urban trips by cycle, to Northern European cities such as Munster (48% of trips by cycle), Delft (43%) and Copenhagen (20%).

### ...and cars can be dangerous to others even when stopped:

Car drivers suddenly opening doors risk injuring passing cyclists on crowded streets, because moving traffic forces the cyclists close to parked vehicles. Whether they hit or the door or swerve out into traffic they get injured. Prosecution of the driver can result. 'Think Bike!'

Drivers are also required by law to not double-park, nor to stop in cycle lanes.

## 10. Cars pollute the atmosphere and waterways

Worldwide, **motor vehicles contribute 15% of the carbon dioxide emissions from human activity**: four tonnes per year from each car used for daily commuting (about 225g carbon per km). This basic figure does not include their share of the extra CO<sub>2</sub> emissions from oil-associated exploration, ocean transport and fuel refining. Carbon dioxide contributes to 'global warming' and resulting climate instability. (see *Energy readings for more info.*) Methane from grazing animals and waste is however the largest NZ contribution to global warming because it is more 'effective' per molecule as a warmer than CO<sub>2</sub>.

Domestic transport was the largest source of CO<sub>2</sub> emissions in 2003 and had increased by 68% since 1990<sup>9</sup>.

Each moving car releases about 74 million cubic litres of polluted air in its lifetime. Pollutants such as soot, nitrogen oxides and sulphur oxides into the air (detail below), and also tiny particles of worn tire rubber and brake linings are left on the road behind it – about 18 kilograms in its lifetime.

In NZ our cars are predominantly older vehicles with less efficient pollution controls than the potential offered by the latest 'clean burning' electronic technologies. We did not even inspect the emissions of imported vehicles until 2007. Very few new catalytic converters are fitted onto exhausts here as these are not required by NZ legislation. Imported used car 'cats' are mostly chemically in-efficient by their age on arrival from Japan.

We also had lower grade fuels permitted here than some other countries. For

<sup>9</sup> Info from Ministry of Economic Development: Energy Greenhouse Gas Emissions 1990-2003 Report.

example the high levels of sulphur in, and soot from burning, diesel have prompted protest by Auckland Regional Council, alarmed by high pollution levels in their streets and its association with asthma and respiratory diseases<sup>9</sup>. Since 2007 only low sulphur diesel is available, which will directly reduce particulate emissions and also encourage the importation of cleaner diesel vehicles, further reducing particulate pollution as well as emissions of nitrogen oxides, hydrocarbons and carbon monoxide (source: Ministry of Economic Development) However, even with this improvement, urban diesel vehicles will still produce far more pollution than petrol engines<sup>10</sup>.

Heavy goods diesel-fuelled vehicles produce 41% of vehicle emissions of fine particles to air (PM<sub>10</sub>). (Source, Auckland Regional Council website.) A report commissioned by the Ministry of Transport estimated that 250 people die prematurely each year in Auckland due to exposure from vehicle emissions.

So what is the answer? NZ legislation requires on-road exhaust smoke emission to stop within 10 seconds – there's a \$150 fine for infringements. Emission testing is also done at warrant of fitness time.

The main air pollutants emitted by the internal combustion engine, when burning petrol or diesel, are:

- **heavy metal** traces, because they are natural components of the original oil (though the introduction of unleaded fuel has resulted in a substantial decrease in lead levels)
- **hazardous air pollutants** – molecules such as benzene, di-chloro-methane, formaldehyde,

<sup>9</sup> A health report on Auckland inner city streets showed levels of NOx, CO and sooty particulates exceeding World Health Organisation guidelines on 48 days in 2001 and 35 in 2002.

<sup>10</sup> The much vaunted (for its fuel efficiency) VW Golf TDI diesel produces 20-25kgs of pollutants for every 25,000kms travelled, compared with 5kgs for its petrol equivalent.

toluene and other suspected carcinogens, some held on tiny soot particles (PM<sub>10</sub>)

- **carbon monoxide (CO)** is toxic when inhaled, as it impairs the oxygen-carrying capacity of red blood cells<sup>11</sup>. Vehicles emit 65% of the toxic CO emissions to atmosphere, on average across the OECD countries. Catalytic converters can significantly reduce emissions of carbon monoxide (cutting it by up to 75%, but only once warm – they are not much use on short winter trips in town
- **nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>)** – irritate the lungs, make rain and soil acidic and also in hot sunny conditions create ozone (O<sub>3</sub>) at ground level (where it is nowhere near as useful to the planet as in the 'ozone layer' of the upper atmosphere). It forms a toxic **photochemical smog** irritating eyes, nose and lungs as well as damaging plants. Catalytic converters also reduce exhaust nitrogen oxides in city driving but are less effective at higher speeds
- **sulphur compounds** (which can be reduced from 2400 parts per million to 1000 ppm by choosing low-sulphur fuels) also irritate our lungs and create acidic rain. Lichens growing on trees and stone surfaces are sensitive to sulphur, so their disappearance from cities is related to burning of sulphur-containing fuels, including coal and diesel.
- **CFCs**. Air conditioning units in older cars contained chloro-fluorocarbon refrigerants, which if released and not reclaimed at disposal of an old car, damage the atmosphere's ozone layer. Such damage leads to stronger ultra-violet solar radiation and in turn to skin cancers and crop damage.

<sup>11</sup> CO also combines with and uses up a natural atmospheric chemical (hydroxyl radical) that would otherwise do a useful job breaking up methane gas (CH<sub>4</sub>) from farm livestock gut emissions. Methane is one of the 'greenhouse gases' warming the planet.

- **PM<sub>10</sub>** or tiny suspended particulate matter (meaning less than 10 microns in diameter) is also produced by motor vehicles, though to a lesser health significance than those from home heating, as you go south in NZ<sup>12</sup>.

A more recent study of Christchurch air pollution for the Ministry of the Environment, released in September 2005, estimated health costs from air pollution costs equated to \$532 per person a year, of which \$404 was due to wood smoke from home heating and \$58 due to motor vehicles (see [www.hapinz.org.nz](http://www.hapinz.org.nz)).



There's cleaner vehicle fuel output from Marsden Point Refinery these days

A study released by the NZ Ministry of Transport in March 2002 estimated that nearly 400 people over the age of 30 die prematurely each year as a result of exposure to particles emitted by vehicles. Compare this to the smaller number of people killed in NZ road accidents! Details at [www.transport.govt.nz/html/14docs/vfecs/niwa\\_report.shtml](http://www.transport.govt.nz/html/14docs/vfecs/niwa_report.shtml).

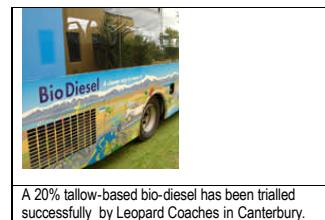
Technological fixes sought to allow car use to continue beyond Peak Oil...

**Myth:** Clean hydrogen fuel cells will replace petrol in vehicles.

**Reality:** Fuel-cell powered cars, under development by several large

<sup>12</sup> In Canterbury, for instance, the regional council estimates motor vehicles contribute only 10% of winter PM<sub>10</sub> emissions, compared with 80% from solid fuel burning for home heating.

manufacturers would dramatically reduce toxic pollution (except for the 50% of emissions and waste from the initial car manufacturing processes), but at a high capital cost to owners. The hydrogen fuel cell is only a compact, portable (and potentially explosive) way to store energy from another source, as it still needs mains electricity to charge the cell. Much the same applies to electric battery storage. Burning fossil fuels in new coal or gas fired power stations to generate this electricity for transport (as we do not have surplus) would create more pollution than using that fuel direct in a car engine. Fuel cells are only 'clean' if they store chemically the energy from non-polluting electricity generation sources such as hydro-turbine, solar, geothermal or wind-power.



A 20% tallow-based bio-diesel has been trialled successfully by Leopard Coaches in Canterbury.

**Myth:** Biofuels will be an option for most transport in future.

**Reality:** They may help to extend the era of fossil fuels. World consumption of ethanol has risen from 2 billion litres 25 years ago to 30 billion litres in 2005. Most demand has come from the United States, Canada and Brazil. Corn crops in Mexico have been diverted, controversially, from food to ethanol production for rich USA motorists - food price rises hit the poor hardest.

In New Zealand, it is estimated that domestic bio-ethanol (made from whey, a by-product of the energy-intensive dairy industry) and bio-diesel (from waste vegetable oils, oil seed crops and animal tallow) could between them replace 5% to 10% of current liquid fuel consumption. If timber and crops were to be grown for biofuels (and for chemicals to make plastics) the competition for land would

increase and fuel would still be needed to grow and process them. If NZ imports biofuels, these may be sourced at the expense of food crops in developing countries, so a knotty ethical issue is emerging.

### Government lead role on energy?<sup>13</sup>

A National Energy Efficiency and Conservation Strategy includes an *Action Plan for Transport* ([www.eeca.govt.nz/strategy/index.asp](http://www.eeca.govt.nz/strategy/index.asp))

This proposes actions such as:

- promoting alternatives to one-person-per-car commuting, including working from home by computer (tele-working) and car pooling by regular commuters
- encouraging lighter, energy-efficient new vehicles for business fleets, and more efficient driving
- introducing a carbon tax on fuel to promote interest in fuel efficiency, and cut greenhouse gas emissions
- providing consumer information labelling on new vehicles' fuel efficiency, as used already in Australia, from 2008. See: [www.fuelsaver.govt.nz](http://www.fuelsaver.govt.nz)
- investigating road pricing and boost funding for alternatives to cars (cycle, walk, bus, rail) through Land Transport NZ and councils.

### Enquire further

If you would like to read more about the connections between rich countries' car use, peak oil production and climate change you could start here:

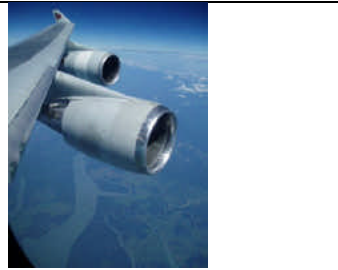
<http://postcarboncities.net>;  
[www.peakoil.net](http://www.peakoil.net);  
[www.sef.org.nz/index.shtml](http://www.sef.org.nz/index.shtml).

And look for the DVDs 'End of Suburbia' and 'An Inconvenient Truth' for some sobering entertainment!

<sup>13</sup> Read more about government policy on sustainability <http://www.mfe.govt.nz/publications/ser/gentle-footprints-may06/html/page7.html>

As an annexe to this reading, which has been mostly about cars, here is some information on another guzzler of fossil fuels - aviation kerosene (for which no biofuel alternative has been devised yet!)

A small proportion of the NZ population fly frequently for their work and others make long distance journeys for holidays or to visit overseas relatives (the so called 'love miles'). In total these create 2% of NZ carbon emissions, but it's growing. Globally there are 18,000 commercial aircraft and the number rises by about 1,000 a year. Airports are being expanded everywhere.



Jet engine CO<sub>2</sub> and high altitude water releases add to global warming

One long haul international flight can release as much carbon to the atmosphere, per person, as many months of car commuting, even though the *rate* of release per km is roughly comparable to travel in a small modern car - because it takes you over so many kms! Also the atmospheric impact of air travel is increased by the vapour release at high altitudes in low temperatures - ice crystal trails form cirrus cloud blankets that trap Earth's heat, especially at night. The overall impact of flying (say IPCC) is about 2.7x the carbon impact of an equivalent motoring distance, or over 5x the impact of the equivalent journey distance by train. From Pacific islands, of course, neither can substitute!

Propellor aircraft, flying at lower altitudes, have lower emissions per km than jets.

What about cruising on a luxury liner instead? Taking several days or weeks to cover such distances in that style actually uses much more carbon per passenger km, as there are higher levels of staff, living space and of permanent powered & heated facilities. Only the cargo-style boat is really efficient on the long haul trips.

Will the next generation abstain from flying as their transport to the 'Big OE', and go occasionally as cargo boat crew instead?

Radical UK writer George Monbiot comments in *Heat- How we can stop the planet burning* (2006), after saying he's not convinced of the value of carbon offsetting on air travel (with this editor's explanatory notes added in parenthesis): "In order to deliver a carbon cut of the size I have discussed (90%), everyone will have to limit their emissions, either today, or in the poorer nations, in the future. There is no choice to be made about whether to abstain from flying or help poorer people buy better light bulbs (with carbon credits). We must abstain from flying *and* help poorer people buy better light bulbs."

Background reading:

[www.sustainabletravelinternational.org](http://www.sustainabletravelinternational.org)  
[www.responsibletravel.com](http://www.responsibletravel.com)  
[www.energybulletin.net/22176.html](http://www.energybulletin.net/22176.html)  
[www.campaigncc.org](http://www.campaigncc.org)  
[www.stopclimatechaos.org](http://www.stopclimatechaos.org)  
[www.greenpeace.org/new-zealand/only-planet](http://www.greenpeace.org/new-zealand/only-planet)  
[www.bethechange.org.nz/](http://www.bethechange.org.nz/)  
[www.climatedefence.org.nz](http://www.climatedefence.org.nz)