



The Sustainable Energy Forum Inc.

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1 Introduction

The Sustainable Energy Forum (SEF) welcomes the Sustainable Transport discussion paper, part of the Update of the New Zealand Transport Strategy (NZTS). We believe that this document shows some encouraging developments in the Government's thinking on the relationship between sustainability and transport.

Nevertheless, we believe that the discussion document does not yet face up to the magnitude of the challenges confronting the New Zealand transport system. A crucial problem is that, while the five objectives of the NZTS are nominally equal, the way the objectives have been evaluated has in practice been weighted against environmental sustainability. This is because weighting is usually done by consultants whose objectives are to comply with the NZTS:

- 'Assisting economic development' is positive: actions must ensure a positive outcome.
- 'Ensuring environmental sustainability' is much more half-hearted. The wording is met if the environmental outcome is neutral or only slightly negative. Long-term incremental effects are not mentioned and are therefore ignored.
- Ever-increasing transport demand, especially on the roads, is seen as essential to economic growth. We argue (in 2.4) that the link is much weaker than this. Indeed, providing for excessive demand while in practice restricting alternatives may in some places be hindering economic growth.

We suggest that the equal weighting given to the five objectives was debatable when the NZTS was released. Now, when the transport system is faced with the twin challenges of climate change and oil depletion, it is clear that these objectives must be reconsidered. The status quo becomes counterproductive when climate change is taken into account, and is even more counterproductive in economic terms if permanent oil scarcity is developing (which we argue in 2.2). The final strategy must address this imbalance by either rewording the key objectives, or prioritising them to ensure that environmental sustainability is given the top priority. The other objectives of the strategy cannot be secured unless the physical environment on which they depend can be sustained.

We have also added a sixth proposed objective: ensuring social sustainability.

2 The context: Entering an era of change and constraint (pp. 2-10)

Two major world problems are converging: climate change and oil scarcity. Both problems are growing more serious and more urgent. Both are exacerbated by a reluctance to acknowledge the magnitude of the changes that are required, let alone to actually make the necessary changes.

Both issues are now at the core of transport, energy and economic policy. They will lead to profound changes in our transport system, and our economic system more

generally. We are only in the early stages of this process.

2.1 Climate change (pp. 48-49)

We are very pleased to see the government taking a stand on climate change. However, we question whether, in the light of the latest evidence on the accelerating pace of climate change, this stand is sufficiently strong.

There is increasing evidence that human-induced climate change is proceeding at or beyond the most pessimistic rates modelled by the Intergovernmental Panel on Climate Change, reflecting the fact that greenhouse gas emissions have been rising more rapidly than predicted, and that the ability of some natural systems to absorb these increased emissions is beginning to decline. For example, in releasing its Synthesis Report in November 2007, the IPCC removed the upper limit it placed in February 2007 — only nine months earlier — on its projections of sea-level rise during this century.

Spurred on by such concerns, the scale and scope of the international political response to climate change continues to increase. The decision of the recently-elected Australian Labor government to ratify the Kyoto Protocol, and to become actively involved in the post-Kyoto climate change negotiations, further strengthens the consensus that effective, concerted international action on climate change is urgently needed.

2.2 Oil scarcity (pp. 47, 53-56)

An explicit assumption in the discussion paper (p. 11) is that the cost of fuel will be significantly higher than today. Although we are pleased to see this reality being acknowledged, this almost certainly understates the scale of the problem.

It is as certain as any prediction can be that oil supplies will go into a geologically-constrained, permanent and irreversible decline, often called 'peak oil'. It is virtually certain that the peak will come before the discussion document's target date of 2040. One recent paper suggests about a 40% probability of a peak event in or before 2010, rising to 80% probability by 2015 (Dantas et al, 2007).

The expected rate of oil production decline a few years beyond the peak is generally given as around 4–8% per year, but some fields are declining at up to 20% per year. The actual rate of decline may be slowed by substitution of other fuels or modern oil-production technology, or exacerbated by unwise actions. These might include the adoption of biofuels that use more energy than they produce; resource wars; or oil fields damaged by 'over-producing' – that is, using techniques which permit the more rapid production of oil from fields, but which reduce the quantity of oil which can ultimately be recovered.

There are several reasons why it will not be easy to increase world oil production, even if there is sufficient oil left in the ground to permit net production increases:

- If the IEA estimate of a 4% per annum decline in production from existing oil fields is correct, this means that 3.2 million barrels per day of new production must be found each year just to keep production levels stable.
- There is a shortage of drilling rigs and other equipment to get at the remaining oil, which tends to be in smaller fields that are harder to access.
- Production from “unconventional” oil sources such as the Alberta oil sands has not met projections, and it does not appear that reserves of such sources are sufficient to make up the shortfall in production that will result from declining production of conventional oil – and nor are gas supplies sufficient to allow significant substitution of gas for oil.
- Oil exporting countries are using increasing proportions of their oil within their own borders, meaning that there is less available for export.

A feature of economic growth is the ‘doubling time’: the time needed for resource use to double under a steady rate of growth. Doubling takes 20 years at 3.5% annual growth, 10 years at 6.9% growth and so on. Each doubling time doubles not only the rate of resource use but also the total resources used.

Many individual oil-producing countries have now passed their production peaks. Their production profiles show that oil production from fields and oil-producing regions typically peaks when about half the total resource has been used. In a global context, roughly one trillion barrels have been used in the last 150 years and another one to two trillion barrels remain, including yet-to-be discovered fields. This and the concept of doubling time lead to a conclusion that may be counterintuitive: even if the optimists are right and the entire producible resource is three trillion barrels rather than two, the date of the peak, which would occur when 1.5 trillion barrels have been extracted, will be deferred only about 10–20 years. Humanity has used one trillion barrels already, so an additional half-trillion will delay the peak by half a doubling period. Even if ultimately recoverable reserves of oil are at the upper end of current estimates, therefore, the peak in world oil production will not be long delayed past the timeframe suggested by Dantas et al.

It is possible that oil exploration currently underway off the coast of New Zealand will result in oil finds and subsequent oil production which are significant by past New Zealand standards. Given that New Zealand operates in the world oil market, however, such oil production would not result in any lowering of the oil price to New Zealand consumers, and it is most unlikely to make any difference to the world oil production and depletion picture.

There is a good discussion of all these issues in a New Zealand context in Tegg (2008).

Some commentators have claimed that, as oil prices rise, alternatives to fossil oil will become more economic, and will be able to substitute smoothly for fossil oil, so that the decline in fossil oil will have little practical impact. However, as noted by Hirsch et al in their seminal paper (Hirsch et al, 2005), in the US, such a substitution programme, even if instituted on a crash basis, would require a lead time of between

10 and 20 years to replace the necessary quantities of fossil oil. Furthermore, no alternative, or combination of alternatives, will ever be as cheap as conventional oil.

The three main alternatives which have been proposed in New Zealand are replacing fossil oil with biofuels, replacing fossil oil with synthetic fuels derived from coal, and converting our transport system so that it is powered by electricity.

Both biofuels and electric transport have a part to play in substituting for fossil fuels. However, even should the environmental sustainability and land use issues which are currently causing a substantial backlash against the adoption of biofuels be overcome, it would be many years before biofuels were able to make a sizeable contribution to total transport energy demand in New Zealand.

New Zealand is among the countries best placed to electrify its transport system, due to our high proportion of electricity generation from renewable sources, and the potential of electric vehicle charging to work in synergy with intermittent renewables (Bull, 2007). In Section 4.6, we discuss ways in which barriers to the adoption of electric vehicles can be overcome. There are still technological, production, market, and certification issues to solve before electric vehicles can play a significant role in the New Zealand vehicle fleet, so although we applaud the Government's commitment to their introduction, they do not provide an immediate large-scale alternative to the use of fossil oil.

Within the coal industry, and in some political circles, there is a belief that converting coal (in particular, Southland lignites) to liquid fuels is "the answer" to oil depletion. There are existing industrial processes, such as the Fischer-Tropsch process used by Nazi Germany in World War II, which can be used to produce liquid fuels from coal. Apart from the lead time necessary to bring such processes online, the chief difficulty with this technology is the very high greenhouse gas emissions that result: emissions per litre from synthetic liquid fuel, calculated on a mine-to-tailpipe basis, are approximately three times the emissions per litre from liquid fuels derived from fossil oil (Goldthorpe, 2006). Given that the concept of "clean coal" remains one of those ideas which is permanently twenty years away from commercial adoption, relying on synthetic liquid fuels to counter oil depletion would have disastrous consequences for New Zealand's greenhouse gas emissions.

Oil depletion has profound implications for our society and economy. It is abundantly clear that, under the conditions of carbon constraint we have outlined, transport funding should be spent on the modes least dependent on fossil fuels. This means that **further road building to relieve congestion will seldom if ever be justified, and that New Zealand needs a rapid transition to a resilient, low-carbon transport system.**

2.3 Rapid change is possible (p. 57)

Rapid change is possible: it has been done before (Gilbert and Perl, 2008). Two examples come from the United States motor industry:

- The industry produced 3.8 million cars in 1941. Production was halted in February 1942 and “the industry’s claim that its manufacturing capacity could not be converted to military production was quickly disproved as the major manufacturers pulled car assembly lines apart, retrofitted as much as 75% of this machinery to produce war materiel from anti-aircraft guns to heavy bombers”.
- The industry responded strongly to the 1970s oil shocks in 1975-1985: average new-vehicle weight was reduced by 40%, engine power by 30% and fuel consumption by 40%.

An earlier but still relevant example is the Liverpool and Manchester Rail-Road, It was built in the context of freight tonnage at the port of Liverpool growing at 16%/year in 1820-25, but the project was opposed for very familiar-looking reasons. (Gilbert and Perl, 2008) When the 1825 Bill was rejected one MP said:

...it can never be advantageous to a country that much of its capital should be unnecessarily annihilated and a vast number of persons dependent on the existence of that capital reduced to poverty, except [when] such a sacrifice is demanded on the clearest public necessity, founded on incontrovertible general principles.

There are several lessons here for the present day:

- The level of proof demanded was too high. This is still a difficulty for major strategic decisions such as choosing a ‘hubbing’ port or ports for New Zealand’s exports.
- In the event, the stage coaches were quickly driven off the route but not out of business. The railway was carrying so many passengers that there was good business in feeder routes.
- Freight transfer to rail was much slower: the canal companies often had direct access into factories and warehouses but the railways needed trans-shipment.
- The outcomes were unpredictable for both railway and canal: the railway company had anticipated fewer passengers and more freight. The canal companies predicted disaster but saw continuing traffic growth.

2.4 Radical policy changes are possible (p. 57)

There is no doubt that roads are essential to current economic activities, but it does not follow that more roads support further growth. The OECD (2006) says:

In the early stages of development of a country, transportation infrastructure is an important contributor to economic growth. Transport investments stimulate growth from the demand side and also contribute to the economic transformation of regions and urban areas affected, on the supply side. In the case of well-developed economies, transportation infrastructure investments can lead to negative results for economic growth. For example, transport investments in one region could lead to competitiveness problems in another. (p. 10)

Long-term economic growth can also occur in the absence of transport investment, especially where transport services are not a bottleneck. Other variables like technological innovations, improved labour productivity, investment in business plant and equipment, [and] human capital improvement, can also drive growth processes. (p. 38)

In the case of well-developed economies, transportation infrastructure investments can lead to negative results for economic growth. For example, transport investments in one region could lead to competitiveness problems in another. If the benefits in the first region are less than the disbenefits to the second, overall economic activity will decline. (p. 38)

It is easy to find examples of economic growth following the opening of a new road. It is much harder to demonstrate that, without the road, the development would not have happened at all. It would be much more likely to have gone ahead somewhere else, perhaps at a rail siding.

A weakness in the case for roads promoting economic development is that road closures may have little or no economic effect (Cairns et al, 2002). (Closures due to crashes are an exception because road users have no opportunity to plan alternatives.) For example, studies of the economic effects of the central London congestion charge have found no overall economic loss. Other cities have closed major arterials with no apparent economic effect.

2.5 Sooner not later (p. 57)

The key to keeping ahead of oil depletion (and climate change) is to take early action (Gilbert and Perl, 2008). The advantages of early action include the following:

- People need time to accept and plan change.
- Government actions signal future conditions, encouraging long-term changes such as purchasing more efficient vehicles or taking up cycling.
- Much greater scope for fleet turnover by the target date.
- Greater scope for accelerated targets, if needed.
- Cumulative savings are larger, thus delaying the supply crunch.
- Reduced oil imports minimise economic disruption.
- Improved resilience minimises the effect of a supply crunch.
- Early markets promote long-term technology changes.

2.6 Resilience (pp. 53-56)

Resilience in a transport system is the ability to absorb disrupting influences with minimum harm and then recover or adapt quickly. One obvious approach is diversity: spreading traffic between modes. Diversity is applicable at all scales: national, companies, families and individuals. Using two courier firms instead of one increases costs but also increases resilience. The same could be applied to personal transport:

walk or take the bus as well as driving. Useful measures of progress towards resilience might include:

- Proportion of trips made by walking, cycling or public transport.
- Proportion of freight (in tonne-kilometres) moved by rail or coastal shipping.
- Proportion of commuter trips shorter than five kilometres made by cycling or walking.
- Proportion of commuter trips avoided by telecommuting.
- Proportion of children using walking school buses.

We are pleased to see some movement towards such an approach in the discussion document.

2.7 Vision for the future (pp. 11-13)

While the discussion document contains some good vision material, much of it is unrealistic for 2040 because it is based on an implausible scenario: minor adjustments to business-as-usual. The discussion document explicitly considers climate change and makes oil pricing assumptions which imply future scarcity. This is good sense, but there is not yet any recognition of a wider problem: limits to growth. In this case the limits are to the biosphere's capacity to absorb waste and supply hydrocarbons. If the world economy is running into limits to growth — and there are other examples that demonstrate this — then conventional economic growth will be impossible in the long term and is perhaps already unwise.

A fundamental assumption of modern economics is obviously invalid. It is impossible for growth to continue indefinitely in a finite space, whether a Petri dish or a planet. We are now seeing this assumption changing from theoretical difficulty to practical limit, with vast implications for business-as-usual and the global economy.

The very nature of car travel (and commercial vehicles up to a point) also sets limits:

- Cars are the least space-efficient form of passenger transport.
- Road traffic is least efficient when demand is greatest.

Other things being equal, a car is always quicker than public transport but, in congested centres, drivers could travel faster still if everyone took the bus (Mogridge, 1997). **Therefore, it makes sense to slow motor traffic and give priority to other modes.**

The overall benefits of car use initially increase rapidly with growing use, but then slow with further growth. The external costs are initially minor but become exponential as social effects and climate change develop: “beyond a certain point the costs of increased mobility may outweigh the benefits” (Gilbert and Perl, 2008; SACTRA, 1994 reached the same conclusion).

Other limits to what is possible are social, summarised by Adams (2005) in two dummy survey questions — Adams argues that one cannot answer “yes” to both:

- *Would you like a car, unlimited air miles and Bill Gates' level of access to all the electronic modes of travel?*
- *Would you like to live in a cleaner, safer, healthier, friendlier, more beautiful, more democratic, sustainable world in which you know your neighbours and it is safe for your children to play in the street?*

We note that New Zealand's car ownership per capita is second only to the United States (Gilbert and Perl, 2008) and is inherently costly: New Zealand is running a high-cost transport system on a medium-income economy.

Putting these points together, we suggest a vision of the direction to take:

- Develop easily-introduced 'kick-start' measures to initiate change, such as lower speed limits and 'feebate' charges on NZ-new vehicles (paragraph 5.3.2).
- Provide incentives for the whole sector to move towards more sustainable transport.
- Develop a fuller understanding of the externalities of transport use, by all modes, and consider charges to internalise costs.
- Set ambitious targets, based on modelling, then model again to assess progress and review the targets. This cycle might usefully be linked to the electoral cycle.
- Seek to achieve change while minimising capital expenditure, again using modelling.
- Seek radical changes in energy use, diversity and resilience.
- Focus on 'barrier busting' (section 4.5).
- Limit the dominance of car use by ensuring that other modes have space to operate safely and conveniently. Speeds can be reduced, traffic diverted or reduced, space freed up for other modes, and delivery times restricted.
- Similarly limit the dominance of freight vehicle use by diversifying onto rail and coastal shipping, and using freight-forwarding depots to consolidate loads onto larger vehicles.
- Accept short-term economic costs to achieve other goals.
- Be willing to intervene where needed. Do not rely on the market without a clear understanding of market failures.
- Plan and encourage a move away from energy-intensive transport. For example, locate transport-intensive plants and warehouses near railways, or build a branch line; encourage grouping of industries to minimise movements of part-finished goods; seek to extend the reach of coastal shipping; encourage local manufacture; encourage urban limits and urban redevelopment to minimise the need to travel.

3.0 Principles for a low-carbon transport system (pp. 11-19)

The Sustainable Energy Forum considers that four principles should be used to guide the transition to a resilient, low-carbon transport system:

1. Reduce the demand for motorised transport.
2. Maximise the alternatives to motorised transport, especially to low-occupancy private vehicles.
3. Minimise the net emissions profile of transport.
4. Where fossil fuels are being used for transport, use them as efficiently as possible and facilitate the transition to renewable alternatives.

These principles form a hierarchy, similar to that noted in the Transport and Environment Select Committee report in 1998, namely: 1. reduce the need to travel; 2. switch to more environmentally preferable modes; 3. switch propulsion methods; 4. improve efficiencies of modes.

In addition, the Sustainable Energy Forum recommends the investigation of a quota that reduces the amount of oil consumed in New Zealand by a set amount each year. The investigation should analyse whether this should best be implemented by the use of a direct quota or of tradeable oil consumption permits. Such a quota can be linked to tradeable greenhouse gas emission permits. One way of implementing such a quota is outlined in Appendix 1, and discussed in more detail in Krumdieck and Sohel, 2007.

1. Reduce the demand for motorised transport, by:

- Facilitating urban design to minimise travel distances and promote safe walking and cycling, including the provision of walkways and cycleways.
- Charging users the real costs of transport on a distance- or fuel- basis, including external and congestion costs.
- Promoting walking and cycling for both their transport and health benefits.
- Providing institutional, social, regulatory and possibly tax support for teleworking/working from home.

2. Where motorised transport is needed, encourage alternatives to road transport, especially the use of low-occupancy private vehicles, by:

- Changing the present funding rules that favour road building over other transport modes.
- Evaluating all proposals for new transport infrastructure against a set of criteria which take into account national as well as local environmental effects (including GHG emissions), effects on the reliance of the transport system, and public health effects.
- Creating a New Zealand Freight Strategy which directs investment towards the lowest-net-emissions methods of moving particular items of freight. It should draw on the results of the Ministry of Transport's *Surface Transport Costs and Charges* (STCC) study (March 2005), and also of Maibach (2007).
Implementing the recommendations of this study progressively between now

and 2015 would be an excellent starting point. Our points in Section 4.4 could also be included.

- Removing the institutional, financial and infrastructural barriers which are currently limiting the movement of freight by rail.
- Providing funding for public transport services to meet existing and future demand. This funding should be spent not just on improving the number and extent of services, but also on improving the quality and usability of services. Criteria here include access, waiting times, transit and transfer times, timekeeping, and providing real-time information to travellers.
- Putting urban planning provisions in place to ensure that housing developments are transit-friendly.
- Using social marketing to encourage behavioural change in individuals' personal decisions on transport mode use.

3. Provide transport energy in ways which have a low net emissions profile and use the minimum possible quantity of fossil fuels, by:

- Electrifying transport, wherever this is both feasible and meets criteria of resulting in a net emissions reduction and lessening the dependence of the transport system on fossil fuels. The introduction of electrification, or its expansion where it already exists, should be investigated across the transport sector. Priorities for investigation include urban public transport (road and rail), the more heavily-used rail freight lines and electric cars and trucks — both plug-in hybrids and fully electric vehicles.
- Replacing fossil fuels with biofuels, where this can be done in ways that reduce net emissions and that meet environmental standards (which should ensure, for example, that New Zealand does not import biofuels which have been produced on land cleared from tropical rainforests) and ensure that land is managed sustainably.
- Further researching and piloting the growing and harvesting of biofuels as part of biotic greenhouse gas management strategies which make use of the natural carbon cycle in managing net GHG emissions.

4. Where fossil fuels are used for transport, use them as efficiently as possible and facilitate the transition to renewable alternatives, by:

- Using a mixture of regulation and incentives to reward the fuel-efficient use of efficient internal combustion vehicles.
- Using a mixture of regulations, incentives and information provision to encourage and reward the importation, purchase and retention of fuel-efficient vehicles.
- Educating drivers in driving techniques which enhance fuel economy.
- Implementing price-based measures to discourage car use in urban centres (e.g. congestion charging), and using the proceeds to enhance the provision of alternative modes.

4.0 General comments on the discussion document

4.1 Transport targets (pp. 16-19)

We have generally made specific comments on proposed and approved targets under the five key objectives of the 2002 New Zealand Transport Strategy (NZTS). There is no discussion of social sustainability in the discussion document, which we suggest as a sixth key objective in section 5.7 of this submission.

We note that three other areas have been neglected:

- There is very little discussion of how barriers to change will be identified and overcome. See our section on ‘Barrier busting’ (4.5).
- There are no priorities allocated to targets. Although we note that this is intended and to be remedied, delay in prioritising targets is likely to lead to delays in achieving them. Some targets should be identifiable as more cost-effective than others, or offering a more resilient transport system, or easier to introduce quickly. The main focus should be on these more effective targets.
- There is not yet any attempt to seek multiple benefits. For example, improving walking conditions and improving public transport will both tend to reduce congestion. However, both will also reduce carbon emissions and are complementary: they will be more effective if developed together. A good resource on multiple benefits is the Victoria Transport Policy Institute (www.vtpi.org).

Some targets merely make reference to an accepted international standard (but which standard?), or even to best practice. These targets need to be more specific. Proposals for benchmarking might be more successful, with statements such as, ‘at least equal to the upper quartile of...’ some stated group of countries such as the EU or OECD.

The intermediate targets do not yet show any sense of urgency, nor is there yet a mechanism for revising targets as a sustainable transport strategy develops. We suggest that intermediate targets be designed to influence public and private planning at all levels, and be introduced quickly.

4.2 Why change is necessary (p. 24)

The discussion paper makes several references to the principal reasons why change is necessary: the transport system’s dependence on depleting fossil fuels, and its rapidly rising greenhouse gas emissions, e.g. Dependence on Fossil Fuels and Greenhouse Gas Emissions (pp. 47-49) and Dependence on Fossil Fuels and Road Transport (pp. 53-56). We suggest that this material should be placed together and given more prominence in the final strategy. It should also be given a prominent place under NZTS Objective 1, Assisting Economic Development: dependence on oil and climate change are both economic as well as environmental issues. We explain why we consider these issues to be so crucial in Section 2, “The Context”, above.

4.3 Intermediate and detailed transport targets (pp. 16-19)

Probably the most important intermediate target is to set a deadline for the end of growth in transport emissions. Given the 62% growth in domestic transport emissions

between 1990 and 2005, and the urgency of action to mitigate emissions, we suggest 2010 as the target date.

The reason for early action is that individuals and the private sector will need time to respond to policy signals when deciding where to live or locate a plant, what transport modes to use and so on. At present they are receiving only a 'business-as-usual' signal.

Other suggested targets and dates are:

- Reduce speed limits by 2010, to save fuel, improve safety and make the active modes safer, more attractive and more competitive. We suggest default speed limits of 80 km/h on the open road and 30 km/h on most urban roads. (Note: One option is to introduce these limits in two stages, the first being to reduce the limits to 90 km/h on the open road and 40 km/h on most urban roads. Vehicles are 11% more fuel efficient at 90 km/h than at 100 km/h (Covec, 2005). However, such a staged reduction would increase implementation costs.)
- Introduce 'feebates' (see our section on 'Vehicle engineering') for NZ-new motor vehicles by 2010.
- Progressively introduce full-cost charging for motor vehicle use by 2015, including carbon charges, externalities and congestion charges wherever congestion is a significant daily problem.
- Make multi-modal studies of the larger centres, looking 10, 20 and 50 years ahead, by 2012.
- Substantially increase funding for public transport and active modes by 2009.

4.4 Guiding concepts (p. 21)

We agree with the guiding concepts given but with some reservations:

- Some modes have external benefits not captured by users, which could reasonably be treated as 'deserved' subsidies.
- Private motor vehicle operators often perceive their costs as well below true costs — often no more than the petrol cost. Such operators would behave more rationally if more of their public costs were paid up-front. A case might be made for at-the-pump charging of some or all of the fixed costs presently included in vehicle registration. This would be less economically pure than present arrangements but might generate more economically pure responses.
- User-pays should not be applied too slavishly. If all road user taxation must be hypothecated for roads, how should company tax or income tax be treated? Roads are essential but so are companies and wages. We suggest that distance-based or fuel-based road user taxation for light vehicles might reasonably include more of the following, with a probably more restricted set for commercial vehicles. Some of these costs could also be charged to some other modes:
 - Excise duties and RUC (no change: to pay for roads)

- Carbon charge
 - Costs previously charged for vehicle registration
 - Vehicle insurance (transferred to insurers: can also be used to ensure that all vehicles carry at least minimal insurance)
 - Congestion charges where needed (transferred to the local authority or to public transport)
 - Rates relief, through increased Financial Assistance Rates (paid to local authorities)
 - Crash costs not already paid through ACC and insurance
 - Health charges to pay for the health effects of pollution (paid to District Health Boards)
 - Health charges to pay a proportion of the costs of exercise-related illness (paid to local authorities to cover provision for daily use of active modes, on health grounds) (NICE, 2008)
 - Capital charges, based on the surrounding land value, for land other than access roads.
- User-pays is very difficult to apply to active modes because of low actual costs and high transaction costs. It is probably not worthwhile. Users of these modes usually pay rates, either directly or indirectly, and can reasonably contribute by that route.
 - In some cases a detailed modal solution may need to be ‘an end in itself’, as a temporary measure until proper evaluation procedures are available. Cycling seems to be in this position at present. It is not an end in itself but neither is it properly evaluated (although we note the supporting target on p. 45 of the discussion document).
 - We strongly support the proposed search for non-transport solutions, and would add that we see major potential in teleworking (telecommuting/working from home). There is evidence that increased broadband uptake can increase the amount of teleworking and reduce urban travel, so the Government has an important role to play in facilitating the uptake of broadband (Nairn, 2007).
 - The barriers to the greater adoption of teleworking are institutional and cultural as well as technical. Furthermore, its potential benefits in avoided journeys tend not to receive the attention they deserve because, in New Zealand, it has been considered under the rubric of labour market policy rather than transport policy. All these factors need to be addressed when considering it as a non-transport solution.
 - There is a missing social dimension.

4.5 Barrier busting (applies to all of “Why Change is Necessary”, pp. 24-52)

There are many barriers to change, at all levels, which must be progressively identified and addressed if the new strategy is to be successful. Design, specification and funding methods have been devised for the status quo over half a century. The

status quo no longer applies. Therefore, determined action to change them is needed. For example, in New Zealand 67% of freight tonne-kilometres goes by road, compared with 31% in the USA, 44% in the EU and 55% in Japan (OECD, 2006 and the discussion document).

Note that the target is **not** to achieve current best practice: it is to achieve something close to whatever will be best practice in 2040.

A preliminary list of barriers is given below:

4.5.1 Evaluation

- Evaluation and funding methods for new road construction are well-established but deficient, often ignoring externalities and emissions.
- Evaluation often ignores ‘triple convergence’, of additional motor traffic from other modes, other routes and other times of day. This effect may fill the new capacity in as little as three years. The result is that estimated benefits for congested routes may be heavily overstated.
- Some roads are seriously under-costed. A back-of-envelope calculation for Auckland’s Grafton Gully motorway estimated that paying interest on the opportunity cost of the land (for inner-city housing) would need a charge of \$4 per vehicle trip (Hazledine, 2000).
- Cost-benefit analysis of cumulative route development such as projects along a highway shows unrealistically high benefits. Evaluating the whole route at once gives a more realistic outcome.
- Cost-benefit analysis favours incremental change over radical change: the benefits of radical change are too little understood; the costs are apparently well understood but often turn out to have been overstated (Gilbert and Perl, 2008; see also 2.3).
- Evaluation relies heavily on notional time savings. The value of time savings is discussed at the end of this section.
- Evaluation and funding for other modes, including rail, tends to be ad hoc and based on methods developed for roading that cannot appropriately be applied to other modes.

4.5.2 Funding

- About half of local roading costs are paid from rates. The result is that those ratepayers who make least use of the roads effectively subsidise those ratepayers who use the roads most, as well as subsidising local road users who live outside the area.
- Funding for roads is routinely provided, but funding for other modes is often capped at a low level, or unavailable on a routine basis.
- Safe provision for active modes is cheap and effective if all modes share the same space. Costly structures such as underpasses, or even footpaths, are only needed if motor vehicle users are permitted to drive faster than is safe for mixed use.

- Funding for commercial access to roads is built in to property values or rents. There is no equivalent arrangement for road-rail transfer facilities, which are paid for by borrowing at commercial rates. Commercial users are understandably reluctant to fund facilities which might be used by their rivals.

4.5.3 Governance

- Car parking on footpaths or cycle routes is officially tolerated even if active mode users are forced into the road.
- Substandard cycle facilities may *reduce* cycle safety but cyclists still are required to use them. Drivers may expect cyclists to keep too close to parked cars or parents may allow a child to use the route in the belief that it is safe.
- Taxation arrangements need reviewing for mode neutrality.
- New Zealand's unique and complex road rules are often poorly understood. They seek to establish which vehicle has right of way in all circumstances, but the result is that drivers who have — or believe they have — right of way tend to see no reason to slow down. We suggest that such false certainty contributes to the road toll. It is probably compounded by the vulnerability of active mode users and a 'no-fault' approach to deaths and injuries which further isolates road users from responsibility for their actions; very limited pedestrian rights to cross the road; and ambiguous rules for cyclists.
- Legally, cyclists are vehicles but many drivers think otherwise. Most kerbside lanes are too narrow for safe overtaking by motor vehicles but not narrow enough to stop drivers from trying.

4.5.4 Planning and design

- Equal treatment of all modes implies that all road-based modes should have safe (including socially safe) and reasonably direct routes between any two addresses.
- The design standards available for cycle facilities are often ignored. Provision for active modes may be seen as a waste of money because facilities are little used. Tolley (1989) says: Making 99% of a journey safe and convenient by foot or bike is futile if the remaining 1% contains a dangerous road crossing or a threatening subway.
- An important aspect of transport planning is to control parking provision, but this is rarely attempted. District plans usually specify a *minimum* provision, but instead, we recommend that a *maximum* level of parking provision be specified. Wellington in particular has extremely high CBD parking provision (Bachels et al, 1999). Attempts to control parking provision often run into opposition from car owners, and would benefit from central government guidelines or support.
- Employee parking is often paid by the employer, thus subsidising car use. A more equitable arrangement is to encourage employers to pay all staff their parking costs as a salary top-up. Staff members can then pay for parking as needed.

- Customer parking is almost always ‘free’ — paid by all customers whether or not they arrive by car. A more equitable arrangement would be explicit parking charges.
- Communities are often divided by transport corridors with too few legal crossing points (this is known as severance). Roads which can be crossed legally may in practice be very difficult to cross safely. The problem is a combination of traffic speed and density, road width and the physical and perceptual abilities of the person crossing. Examples of bad practice include:
 - Excessive crossing distances: sometimes over 30 m for a two lane local road. In such cases crossing times may exceed 30 seconds for an elderly pedestrian (0.8 m/s), which is long enough for a car at 50 km/h to travel 400 m. When the car arrives it has priority.
 - Traffic signals set so that the same elderly pedestrian cannot cross in the total of green time plus flashing red time.
 - Junctions with traffic signals arranged without a pedestrian phase on one leg. Pedestrians have to make two crossings, with delays of sometimes over two minutes; and crossing away from the junction becomes more difficult because traffic leaving the junction is in a near-continuous stream.

4.5.5 Safety

- Drivers do not consider the safety of others, especially pedestrians and cyclists (ICE, 1996).
- A third of New Zealand crash fatalities in urban areas are pedestrians or cyclists. Half of these occur on arterial roads.
- Widening a road makes it safer for motor vehicles but more dangerous for pedestrians, unless the capacity is reduced (Buchanan, 1963).
- Despite helmet laws, cyclists’ risk in New Zealand is about seven times greater than international best practice.
- Free left turn lanes can be very dangerous for both cyclists and pedestrians.

4.5.6 Speed

Over the last century we have all been progressively accustomed to speeds that would have been completely unacceptable if introduced in a single step. If all modes are of equal importance, it follows that speeds are too high on many rural and most urban roads.

- Most urban roads are engineered for speeds greater than 50 km/h. Speeds in excess of 100 km/h are often possible in light traffic.
- The probability of a crash killing a pedestrian is roughly 95% at 70 km/h (conventionally the highest urban speed limit), 70% at 50 km/h and 10% at 30 km/h. (Patterson et al, 2000)
- At 50 km/h a driver cannot appreciably slow to avoid a pedestrian first seen at a distance of 20 m — a typical junction width. In a crash the probability of causing death is about 70%. At 30 km/h a driver can stop in 20 m and avoid a crash. (Patterson et al, 2000)

- A driver's useful angle of vision narrows to 25% as vehicle speed increases from 25 to 50 km/h because of data processing limitations. (Hass-Klau et al, 1992)
- Active modes may be 'perceptually invisible' to drivers, again because of data processing limitations.

4.5.7 Standards

- Road works for general congestion relief usually make public transport services worse relative to private car use, and sometimes absolutely worse. Despite some priority, buses in central Wellington are often slower than walking.
- Buses often pull into bus bays for a stop and have to wait for a gap in the traffic before leaving. A common European approach is for the bus to stop in the traffic lane (unless there is a separate bus lane), tacitly recognising the bus's external benefits.
- There is no widely recognised manual of cycle facility design in New Zealand. The principal available standard is a local modification of the Australian Standard and is well below best practice. There is no standard for design of space shared by cyclists and motor vehicles.
- Most authorities use a roading hierarchy, from local roads to motorways. This is good sense up to a point but creates problems if taken too far: too many levels of hierarchy and too close a focus on motor vehicles. The UK Institution of Civil Engineers (ICE, 1996) recommend no more than four levels (roads of local, regional and national importance, plus access roads) but some New Zealand hierarchies have as many as seven levels. Problems include:
 - Roads further up the hierarchy are assumed to need a high priority for motor vehicles, regardless of other needs.
 - There is no 'push-back' for other modes, which are often assumed to be unimportant.
 - A state highway is placed at the top of the hierarchy even if it is also an access road.
 - Very few state highways are designed for active mode safety, despite the frequent lack of any local alternative route. (This point is expanded upon in our comments on urban design.)
- Many recently-built residential access roads are too wide and have very large kerb radii at junctions. The result is that drivers can turn too fast, cyclists have no clear path through a junction, pedestrians have too far to cross and both pedestrians and cyclists tend to become invisible.
- Many roads are designed for inappropriately high speeds. A cheaper and much better approach is to design all roads to an appropriate standard for the intended use. Ideally the design of the road should indicate its level in the hierarchy by using a standard 'family' of parameters, as is the case in Denmark: speed limit, lane width, curve radius, junction design, cycle provision and so on.

4.5.8 Training

- Traffic engineers are generally not trained to design for either public transport or active modes. They tend to see their job as provision for motor vehicles and assume that the result is satisfactory for all road users.
- Drivers also need training. At higher speeds drivers can be ‘astoundingly ruthless’ towards active mode users (Elliot, 1994). Pucher and Dijkstra (2000) draw attention to very different practice in Germany and The Netherlands: *Having the right of way by law does not excuse motorists from hitting pedestrians and cyclists.*

4.5.9 Value of time savings

A primary justification of highway projects is time savings for motorised road users, but important weaknesses become apparent when all modes are considered equally.

- People seem to allow themselves a time budget for travel, or about one hour a day (range 0.5 to 1.5 hours per a day) regardless of GDP per capita. They tend to use travel time savings not for other purposes but to travel further. This contributes towards road-building, thereby encouraging urban sprawl (Gilbert and Perl, 2008).
- Valuing time savings encourages promotion of faster modes and directly encourages energy use and urban sprawl.
- All time savings for the same mode and purpose carry the same value, but it is known that some trips are worth much more than others. This is the basis of congestion charging. Indeed, some trips probably have external costs greater than their internal benefits (SACTRA, 1994).
- Valuing users’ time savings makes speed reduction an apparently costly exercise and creates the illusion that little can be done about the safety of active modes. Other factors suggest a much lower real cost: ordinary cyclists frequently win commuter or even shopping-with-children races against cars, and other supposed time savings disappear while finding a car park.

4.6 Barriers to the uptake of electric vehicles (pp. 18-19 and 50-51)

The first target on p. 18 is to “identify and remove any barriers to the uptake of plug-in hybrid and full electric vehicles that meet appropriate safety standards.” SEF does not consider that electric vehicles are, of themselves, ‘the answer’ to the sustainable transport quandary. However, if they are introduced as part of a package which also implements the measures we have proposed above and gives greater prominence to public transport, active modes, and non-transport alternatives such as telcommuting, they do have an important role to play in a sustainable transport system. After discussions with those working in the field of electric vehicles, SEF notes the following barriers that need to be addressed:

- The focus in the discussion document is on electric or semi-electric private motor vehicles. Electric rail, light rail and trolley buses have been ignored but are at least as significant. Options at the sub-car level, such as electric motorbikes and electric scooters, are also likely to play an increasing role.

These options range down to electric bicycles, which are very useful in cities such as Wellington.

- Lack of consumer knowledge. There is still widespread ignorance of electric vehicles, and among those consumers who have heard of them, there remains a perception that they have limited range, low speed and low capacity, and are not “real” cars. Private initiatives, such as Meridian Energy’s planned electric vehicles trail, should go some way towards dispelling these myths, but there may also be a role for LTNZ and EECA in providing a more accurate picture of modern electric vehicles.
- Lack of knowledge within the motor vehicle industry. Car dealers, mechanics, and others (such as many vehicle certifiers) demonstrate a strong preference for sticking to what they know — the internal combustion engine. As a starting point, vehicle certifiers should be fully trained in certification issues relating to both imported EVs, and conversions of vehicles already in the NZ fleet from IC to electric engines.
- For conversions of IC engines to EVs, warranty issues that arise with vehicle manufacturers need to be dealt with.
- Lack of charging points in urban areas. Although it is envisaged that EVs will primarily be recharged at home, it would be useful to have charging points for both electric scooters and motorbikes and electric cars in central areas, such as car park and bike parks. Local government has a key role to play here.
- The capacity to recycle EV batteries, such as lithium ion batteries. Just as the disposal of CFL lamps has recently caused public comment and concern, so arrangements to recycle EV batteries need to be in place before these become a substantial part of the waste stream.
- Frontal impact rules which restrict the importation of existing EVs, such as the Indian Reva, which is already on sale in the UK. We suggest that a separate vehicle category for such EVs, similar to the quadricycle category in the UK, be investigated. This category would restrict the use of such low-specification EVs to urban centres and in return permit frontal impact standards less stringent than those for open road vehicles.
- Electric engines are inherently more efficient than IC engines. In the New Zealand context, the key advantage of electric vehicles over IC-engined vehicles is that most or all of their power can be derived from renewable electricity. In order that this advantage be maintained if electric transportation is widely adopted, electricity generation, transmission, and tariff issues will need to be carefully addressed before EV recharging becomes a significant proportion of overall electricity demand. We are encouraged by the work that the Electricity Commission is already doing in this area (Bull, 2007).

5.0 Specific comments

5.1 Energy targets (pp. 16-18)

We note that these targets are already approved.

Halve the per capita domestic greenhouse gas transport emissions by 2040 (p 17)

This target, based on a 2007 baseline, fails to allow for three points:

- The possibility of greater per capita reductions than needed for a purely domestic climate-change response, so as to allow some growth in per capita emissions by developing countries
- The possibility (as discussed in section 2 above) that the emissions cuts suggested by the IPCC in its most recent reports are not sufficient to address the risk of dangerous or irreversible climate change
- Uncertainties in oil price and increasing oil scarcity, again as discussed in section 2.

Furthermore, the target should be for an absolute, rather than per capita, transport emissions reduction. We suggest a substantially tougher target for 2040:

A 50% reduction in absolute net transport carbon emissions compared to 1990 levels.

We acknowledge that this target may need to be strengthened in the light of further scientific evidence on the risks of climate change and oil depletion.

Reduce the kilometres travelled by single occupancy vehicles in major urban areas on weekdays... (p. 17)

This target is too vague: what constitutes a major urban area, and why is the focus only on weekdays? Is the target any advance on present practice: inferring total vehicle kilometres and including a travel-to-work question in the census?

The focus on weekdays implies an emphasis on commuter traffic and peak hours. See our discussion of the public transport growth target in 5.2.

5.2 Assisting economic development (pp. 25-33)

We comment in section 2 on the weak or possibly negative link between road building and economic growth in an era of resource constraints.

The discussion document emphasises more than once that, as a 'remote exporting country', New Zealand depends on cost-effective transport. While this is true, it is equally true of other countries and for costs in other areas of the economy. The important point is that such rhetoric must not be allowed to justify the status quo. Full cost charging of road use will increase export costs but reduce costs elsewhere. Protecting exporters (within WTO rules) is a reasonable objective but to treat it as a transport objective is, in effect, to insist on continuing subsidies.

Travel times by all modes will be predictable (p. 29)

The target needs to be much more closely defined. As it stands it could be another charter for road building. It is not very long since New Zealand rail freight was 'predictable' to several days, and some European public transport systems are predictable to a few seconds. We suggest targets such as:

- Intra-city freight predictable to 80% within 30 minutes for at least eighteen hours a day.
- (Probably lower targets for coastal shipping)
- Average pedestrian delay at traffic signals 30 seconds with a maximum of 75 seconds.
- (Cyclists the same as motor vehicles when on-road and the same as pedestrians when crossing with them)
- Public transport predictable to at least 90% within 0.5 minutes early to 3 minutes late.

Congestion

The last paragraph on page 28 of the discussion document makes the important point that some congestion must be accepted, but the updated NZTS needs to say more about where, when and whether capacity should be increased:

- Climate change and oil scarcity need to be taken seriously.
- The economic benefits of new roads are often less than assumed.
- Motor vehicles are the least space-efficient mode, the least energy-efficient, the most polluting and the most difficult to provide for.
- Estimates of the cost of congestion mean very little because they compare actual conditions with an unrealistic ideal, and can be used to justify any policy.

Decisions about transport capacity increases need to take a holistic approach:

- Consider carbon emissions, other external costs and the likelihood of future energy scarcity. This analysis is fundamental to meaningful transport planning in a carbon-constrained world.
- Consider interactions between modes, including triple convergence and the Downs-Thomson effect (The quality of peak-hour travel by car tends to equal that of public transport: Mogridge, 1997; Wood, 2007).
- Indicative studies should evaluate costs and benefits for all modes on an equal basis, looking ahead ten, twenty and fifty years.
- Projects must ensure that all modes are catered for and all are on reasonably direct routes built to a high standard, but not necessarily all on the same corridor.

A useful measure would be for regional councils to set specific priorities for road use by mode. Several European cities have used this approach and have usually placed walking first and on-street parking last.

Rail study target (p 30)

The supporting target of a feasibility study of railway improvement options is welcome but hardly ambitious. A modern electric railway system using electricity that is 70% from renewable sources (the approximate current figure in NZ) has emissions

per tonne-kilometre an order of magnitude lower than road haulage. Given the twin constraints on fossil fuel use discussed in Section 2 above, such a substantial advantage must be taken more seriously in the new transport environment. SEF recommends a more ambitious and thoroughgoing investigation of transport electrification.

Public transport growth target (p. 29)

Again, this is hardly ambitious, given the growth rates that are already being seen. Public transport has traditionally been seen as providing for commuters and the socially disadvantaged. This is appropriate enough for ‘predict and provide’ congestion studies where the commuter peak is seen as the main problem. When this view is adopted, it appears reasonable to provide a largely radial public transport service at peak hours and a skeleton service at other times.

The traditional view ignores the roughly two thirds of trips made outside peak hours, which also need to be targeted if the focus is on carbon emissions and oil scarcity. This suggests a further target: encouraging people to do without the second car, or without a car at all. This is challenging but not impossible. ‘Push’ factors, away from car use, are discussed in our section 2.7. ‘Pull’ factors for public transport could include:

- Twelve month season tickets offered at a substantial discount and invoiced monthly.
- Season tickets valid for the whole family in the evenings and at weekends.
- Quick and reliable non-commuter trips, to anywhere from anywhere else. This needs good transfers, made quickly and reliably, preferably cross-platform and under cover.
- Good timekeeping.
- Safe access to all stops, including social safety.
- Ensure that at least some routes are orbital.
- Minimise delays in congestion, with traffic signal priority.
- Minimise delays at stops by using an off-bus ticketing system or something like the London ‘Oyster Card’ (which automatically gives passengers the best available discount).
- Frequent services (a rule of thumb is that routes are much more attractive if there are more than about 8-10 services an hour).
- Cycle storage facilities at some stops.

Given the high set-up cost of off-bus ticketing systems, we suggest a single system for the whole country, as has been done in the Netherlands. The objective should be to increase the speed of trips by public transport (Wood, 2007), focusing on all phases of all trips, and making roads safe for active modes.

The reason for accurate timekeeping targets for public transport is to allow fast and reliable transfers, essential to a good public transport system. A particularly good

system is Zurich, which achieves a bus and tram timekeeping accuracy of 95% within a band of thirty seconds early to ninety seconds late. This has been done by progressive development to achieve three objectives:

- *Unhindered trips between junctions, without holdups caused by private traffic, to be achieved by building special lines [for trams] and separate bus lanes.*
- *'Zero' waiting time for public transport vehicles at light-controlled junctions, by developing a fully flexible control philosophy.*
- *Extension of the data-control operational control system, so that the operational control centre is always informed about deviations from the timetable and other programmes, and can remedy the situation of help by putting previously-designed measures into effect. (Joos, 1990)*

The public transport growth target might be overtaken by events and we suggest planning for a greater rate of growth, with scenarios encompassing public transport providing 30, 40, and 50% of such trips.

Contingency planning might include storage of withdrawn vehicles for possible re-use.

Effective real-time information systems in place to enable road users to plan their journeys to ... (p. 29)

For two reasons, this target may be unwise:

- A 'successful' project might not have the expected outcome. Giving all drivers real-time knowledge of the most congested roads would encourage 'rat running' and allow drivers to use all roads close to capacity. This would remove the most effective protection against gridlock and make large traffic jams more common.
- It would be a distraction from more useful real-time information for passenger transport.

Lift coastal shipping's share of inter-regional freight to around 30% ... (p 29)

Lift rail's share of domestic freight to around 25% ... (p 29)

.

These targets are very welcome.

5.3 Assisting safety and personal security (pp. 34-37)

The only specific secondary targets under this heading are for light motor vehicles: stability control and better occupant protection. There are some interesting ideas for the safety of other modes in the discussion document, but no sense that the safety of these modes is or should be a high priority. The impression is that nothing specific will be done about the active modes, heavy trucks, pollution-related mortality and morbidity, or even rail. Yet, in a future transport system no longer designed for and dominated by the private motor vehicle, the safety of these modes is of at least equal importance.

Research in the UK has shown that some rail safety measures *increase* transport deaths and injuries because they make rail too unattractive (cost or delays during installation or remedial work) and so divert passengers onto the roads.

Some potential rail passengers (and bus users), particularly women, avoid public transport use, especially at night, because they perceive it to be unsafe. SEF recommends that measures to mitigate both the real and the perceived lack of personal safety when waiting for and using public transport should be investigated, piloted, and implemented where found to be effective.

Road deaths no more than 200 per annum (p. 35)

In itself this is a good target: it is specific and ambitious. Yet it is also a distraction in some critical respects. It focuses on a limited set of crashes: those involving a motor vehicle and causing death or injury. This has the effect of concealing serious risks faced by users of other modes. For example, applying world best practice to cycle safety would reduce casualties by 80% or more. This might be a low safety priority because of low numbers but there are wider gains in modal split, public health, congestion, public transport use, energy use, pollution and emissions. We are very pleased to see in the discussion document that anomalies such as this are to be challenged.

Another limitation is that, for the active modes, absence of crashes does not indicate safety. Even experienced cyclists avoid some roads because they think the risks too high. Pedestrians plan routes and even destinations to avoid unsafe crossings.

We note a supporting target for ‘subsets of road traffic’. We urge that data be expressed in exposure terms, accepting the uncertainties, as well as absolute numbers: deaths, deaths per trip and deaths per billion kilometres. An overall figure is probably useful for safety publicity purposes but the important figure for policy-makers should be risk exposure by mode. Targets should also be by mode.

New safety targets could usefully draw a distinction between safety-to-self and safety-to others. One effect of such thinking has been noted in Europe: teenage drivers are usually safer to themselves on a bicycle and are certainly safer to others. If the same thing could be demonstrated in New Zealand it would reinforce the case for raising the driving age.

Vehicle engineering (p. 34 of the discussion document)

New Zealand is often described as a ‘taker’ of vehicle technology, but as a country, we can choose what we take. Indeed, a ‘taker’ nation can be more selective because it has no commitment to internal sources and can focus on best practice.

There is ample scope for improving light vehicles to better meet discussion document objectives. Hybrid and all-electric vehicles can play their part (as discussed in our section 4.6) but the main initial focus should be on conventional vehicles entering the fleet. Substantial changes are possible by reducing power and weight, and making greater use of ‘common rail’ (Euro 3+) diesel engines.

New Zealanders could be encouraged to buy more economical vehicles through ‘feebates’ for all NZ-new motor vehicles, using revenue-neutral charges to penalise inefficient vehicles and subsidise efficient vehicles. Charges could be based solely on fuel consumption or on some formula including factors such as weight, weight:power ratio, engine capacity and fuel consumption. However, a perverse effect would be to devalue existing efficient vehicles. It is often assumed that newer vehicles are more fuel-efficient, but as their engines are on average larger, the net fuel efficiency of the fleet can be reduced if the fleet replacement process, and system of incentives and penalties, is not implemented well.

Many light vehicles are ‘positional goods’: larger, more powerful and more costly than needed, so as to demonstrate their owner’s status. Such vehicles are not in the public interest if carbon emissions are important, and a feebate formula might usefully include weight:power ratio and price.

5.4 Improving access and mobility (pp. 38-43)

A fundamental problem with access and mobility is confusion about the terms’ meaning, only partially resolved in the discussion document. The two terms are commonly used together, making them largely meaningless. ‘Access’ is often used to refer specifically to people with disabilities, or even more specifically to wheelchair users.

Three concepts must be kept separate:

- ‘Access’: Access to goods and services is well covered by a target in the discussion document (p. 40). (We suggest that ‘shopping centres’ in the text is unfortunate because it implies that access should be by car. ‘Shops’ would be better)
- ‘Mobility’: The ability to gain access over a wide area. Motor vehicles are the classic method but in heavy traffic a bicycle is often faster.
- ‘Disabled access’: Special access provision for those who walk slowly, cannot walk far or cannot walk at all. The spectrum runs from parents with small children to electric wheelchair users. Disabled access is important in public transport, not least because easier access makes services faster for all.

Travel times by principal routes to be improved relative to 2007 for ... (p. 40)

Travel times by all modes will be predictable (p. 40)

Both these targets imply reduced congestion, or at least no change in congestion. Given the present institutional arrangements it is inevitable that such targets will be interpreted as a charter for continued road-building. We suggest an explicit statement that road building to relieve congestion will rarely be a good use of funds.

Rural transport (discussion on p. 40)

Rural and provincial areas of New Zealand are particularly hard hit by rising transport costs. Services such as hospitals which used to be available in rural areas are now centralised in cities, meaning that rural people have to travel long distances to access them. As transport costs rise, there is an increasing case for re-localising some or all of these services.

We understand that a rural public transport study was made some years ago but we have not seen it. The reported basis was that existing services could be integrated and slightly expanded to make them more effective at reasonable cost. A network of passenger, parcels and freight services could be integrated from existing rural bus and long-distance coach services; rural mail delivery; couriers; taxis and school buses. Some services could run to timetable and others be on-demand. These proposals are worth further consideration. The key point is to recognise that transport in rural areas has different issues, and may require different solutions, to transport in urban areas.

Urban design (p. 40)

We agree that urban and transport planning need to be coordinated. Design needs targets for improvements, but they may not all be transport targets. Areas chosen for attention might include:

- Encouraging ‘smart growth’ (urban villages): areas of redevelopment for high density living and working, in a largely car-free environment centered around excellent public transport.
- Ensuring that local authorities have mechanisms and funding available to accumulate land for smart growth.
- Setting limits on parking provision for all new developments, but with no minimum.
- Planning public transport services and interchanges as an integrated whole.
- Opening selected links to active modes, to allow more direct routes.
- Closing selected links to motor vehicles, to make space or improve safety for active modes, close ‘rat runs’ and make space for other uses.

An interesting approach is given by Westerman (1998) who proposes a subdivision of the levels of roading hierarchy:

Type 1 corridors:

Primary transport routes and their environments, where the through-traffic function is dominant and adjoining areas are planned designed and managed to reduce or eliminate friction of impact.

Type 2 corridors:

Secondary transport routes and their environment, where both the transport function and frontage function are important.

Additional mode: light rail

In New Zealand, light rail is too readily rejected on cost grounds when it should be helpful on a few major routes. The most important advantage is high capacity in limited space. Busways can match or exceed light rail capacities but need much greater width and more junction time to do so, with multiple lanes at stops and sometimes also between stops. Single-lane capacities given by the IHT (1999) (all based on a maximum of 60 vehicles/hr) are:

Standard bus on busway	3600 - 4200
Articulated bus on busway	4500 - 9000
Tram	9000 - 21000

Other advantages of light rail include:

- Minimal delays at stops (average 15 seconds).
- Priority phases at traffic signals are short and infrequent, minimising delays to other traffic.
- Semi-reserved routes and priority allow accurate timekeeping.
- High reliability and very low energy use.
- Acceptable in pedestrian malls.
- Bus passengers can transfer to light rail for part of their trip, cross-platform and with minimum delay.
- Bus delays are minimised because they are kept clear of the central area.
- Bus vehicle kilometres are reduced, increasing public transport capacity or productivity.
- Smooth running means that standing passengers are acceptable for short trips (passengers often choose to stand when seats are available).

In New Zealand, light rail is unlikely to be attractive on shared railway tracks unless trains are restricted to running outside light rail operating hours.

5.5 Protecting and promoting public health (pp. 44-46)

Standards specified in targets (targets on p. 44)

References to the Euro 4 emissions standard should also provide for later standards.

Increase walking and cycling and other 'active modes' to ... (p. 44)

Roughly doubling urban trips on active modes looks unambitious, given that a third of car trips are shorter than 2.5 km and could be walked in twenty minutes. Another third are shorter than 5 km and could be cycled in fifteen minutes. In either case the desired travel time reliability would be much greater than for car use. We suggest that the target should be to increase these trip to 50 percent of trips in urban areas. These are challenging targets in today's terms but should be much more achievable in the very different environment of 2040.

We suggest that the most important mechanisms to encourage wider use are charging other modes full costs and redesigning the road environment (layout and regulation) for safe use by all modes.

Investigate the need to revise funding procedures for walking and cycling ... (p. 45)

We do not believe that any further investigation is needed. Funding procedures should be revised for such projects, and funding increased.

5.6 Ensuring environmental sustainability (pp. 47-52)

As we said in the Introduction to this submission, the Sustainable Energy Forum contends that the objective of ensuring environmental sustainability is crucial. All the other objectives, and the additional objective we have proposed of ensuring social sustainability, are highly desirable, but unless the environment is sustainable, none of these other objectives can be achieved.

However, the current reality is very different, for reasons which we explore in section 1. Experience of the NZTS is that this objective is open to abuse. We know of one scheme report for a new urban road which claimed environmental benefits because traffic would flow more freely (the consultant's section heading was '*Encouraging environmental sustainability*'), while ignoring all these effects:

- Additional off-peak fuel consumption because of a higher speed limit.
- Additional vehicle kilometres because drivers would prefer the new route to a shorter alternative. The scheme was specifically designed to encourage this.
- Triple convergence.
- Greater carbon emissions, noise and pollution.

To ensure that the objective of ensuring environmental sustainability becomes a primary driver of transport policy, vague general statements such as "a transport system that places manageable pressure on the environment" need to be replaced by specific, preferably quantified, performance goals and targets. In the area of greenhouse gas emissions, we propose the following targets for 2025 and 2040:

No further growth in transport greenhouse gas ambitions after 2010

A 15% reduction in net transport carbon emissions on 1990 levels by 2025

A 50% reduction in net transport carbon emissions on 1990 levels by 2040

Intermediate progress goals towards these targets should then be set.

Overall and intermediate targets should also be set for the quantity of fossil fuels used by the transport system. The approach proposed in Appendix 1 provides one way of implementing such targets.

Increase the public transport mode share of peak hour travel (journeys to work) in Auckland ... (p. 50)

Separate targets for each city would be better: Wellington is already close to 20%.

Again, the focus is on peak-hour mode share, when two thirds of trips are outside the peaks. See our comments on the public transport growth target in section 5.2.

We wonder why peak hour travel is redefined as journeys to work (except perhaps to fit with census data)? The reality is that students of all ages, many of them escorted, are a major component of peak hour travel.

Are additional targets needed... around engine size?(p. 52)

We suggest that ‘feebates’ (see our section on ‘Vehicle engineering’ in 5.3) would be a better approach than engine capacity targets, although engine capacity could be part of a feebate formula. We suggest that the targets are achievable and should be more ambitious.

How can the reduction in single occupancy vehicle travel best be achieved? (p. 52)

There are a number of ways of reducing the proportion of single-occupant light vehicle journeys:

- Promoting carpooling and car sharing. This can be done at several levels: in workplaces, in communities, and nationally. Some operators of car-sharing services have run into difficulties with the present definition of taxi services. An appropriate definition of car-pooling and car-sharing needs to be created to give such services a clear legal basis, and some government assistance (perhaps in the form of mentoring and business advice) may be needed to ensure that one or more such services reaches the necessary size to operate effectively at a national level.
- Social marketing which points out the wastefulness of such journeys and their effects on the environment.
- Peer pressure.

We are doubtful about high-occupancy vehicles running in public transport lanes. A recent complaint about the waste of road space on the North Shore busway completely missed the point. The objective is moving passengers fast enough to reduce traffic by attracting car drivers to public transport, *not* covering the road with vehicles.

Should we develop initiatives to ensure turnover...? (p. 52)

One method of encouraging change in vehicle fleet composition is feebates but this is not the same thing as fleet turnover. We suggest that the efficiency of the vehicles entering the fleet is more important than the rate of turnover. We note that the engine size of imported vehicles has been increasing in recent years (Ministry for the Environment, 2008).

A new method of inducing fleet turnover has just been introduced in Berlin and will be progressively introduced in other German cities. The system uses compulsory windscreen stickers for all vehicles (including tourist vehicles) entering the central area. Stickers are coloured according to the level of emissions control on the engine (obtainable from the registration papers) and are already unavailable for Euro 1 engines. Euro 2 and Euro 3 engines will be excluded from Berlin from 2010. For a tourist information leaflet in English see <http://www.berlin-tourist-information.de/bilder/verkehr/flyer-umweltzone-en.pdf>

We understand that emissions control equipment is sometimes removed from second-hand vehicles imported into New Zealand.

5.7 Proposed additional objective: Ensuring social sustainability

Some commentators on sustainability in transport focus only on economic sustainability, covered in the discussion document under ‘Assisting economic development’. A broader definition of sustainability is covered in the discussion document under ‘Ensuring environmental sustainability’. As we have already noted, we believe that this is a key objective, but social sustainability is still missing.

Social sustainability has traditionally been seen as supported by transport policy but largely separate from it. One area where this approach breaks down is in urban design, covered in the discussion document.

A probably wider link, only touched on in the discussion document, is feedback between social policies and the principle of charging full transport costs, including externalities. Social costs in the following areas are likely to be reduced if transport policy is switched from business-as-usual to a sustainable transport approach (adapted from Adams, 2005). They might reasonably be incorporated into transport mode costs and benefits, although quantifying them would be a challenge:

- A more concentrated society with less need to travel.
- Greater equality with less polarisation.
- Safer transport with improved access.
- Greater freedom for children.
- Improved public health.
- More culturally varied.
- Less anonymous and crime-ridden.
- More democratic.

The principle here is that transport policy development should take account of indirect external benefits in some formal way.

Another important area is planning for oil scarcity. As oil becomes increasingly expensive and hard to obtain, relying only on price to curb consumption will lead to wealthy people being able to afford non-essential uses of fossil fuels, while poor people become further impoverished through reduced access to employment and other social goods.

6. Air and sea transport (p. 10, p. 29, Appendix C)

On p. 10 of “Sustainable Transport”, air and sea transport are listed as among those sectors for which intermediate targets are to be defined. However, the document does not subsequently discuss air and sea transport except in the context of safety, plus one target relating to oil spillages (in Appendix C). SEF contends that these sectors deserve fuller consideration, since both air and sea travel are heavily dependent on fossil fuels, are a considerable source of greenhouse gas emissions, and have major flow-on effects to other aspects of the transport system. We propose that the NZTS

should be amended to give substantially more coverage to air and sea transport and that the following steps be taken in these policy areas:

1. Ensure that the necessary data collection facilities are in place to be able to do full lifecycle emissions accounting for air and sea transport to, from, and around New Zealand.
2. Play a positive part in international negotiations to ensure that emissions from international travel are included in international accounting for GHG emissions, and that the factors which exacerbate aviation's climate effects (such as the formation of contrails, and the height at which emissions are released) are taken into account.
3. In parallel with greater support for teleworking and telecommuting within New Zealand, provide support and incentives for international business travel to be replaced by teleconferencing and internet-based communications wherever possible.
4. Encourage research into environmentally more sustainable alternatives to present methods of air and sea travel.
5. Encourage the tourism industry to continue preparing for the prospect of a future in which fewer tourists visit New Zealand, and those that do, stay for longer.

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Note a: Some recent local research is reported in <http://www.theauckland.co.nz/story.cfm?storyID=3762791> (downloaded 2008-02-06)

About the Sustainable Energy Forum

The objective of SEF is to “facilitate the use of energy for economic, environmental and social sustainability”. SEF is a group of individuals and companies interested in promoting information and supporting action which will help move New Zealand toward a sustainable energy future. SEF has a membership of around 170, ranging from staff in major energy companies to students and retired people. Many members are active in small-scale sustainable energy supply and energy efficiency businesses. See <http://www.sef.org.nz> for further information and membership.

Appendix 1: A proposal to restrict fossil fuel consumption

The proposal

The most direct way to reduce the consumption of fossil fuels is to allow less of them to be sold. Dr Susan Krumdieck of the Department of Mechanical Engineering at Canterbury University proposes that the following limitations be put on fossil fuels (Year 1 is the year of introduction):

Government quota on oil and finished petrol product imports:

- Year 1 imports will be capped at 90% of 2005 level. (It appears that this would be roughly a 7% reduction from 2007)
- Year 2 imports will be capped at 80% of 2005 level.

Government quota on coal sales (including both domestic and export sales):

- Year 1 coal sales will be capped at 90% of 2005 level.
- Year 2 coal sales will be capped at 80% of 2005 level.

These quotas would continue to reduce over time. SEF believes that this proposal warrants serious investigation. Clearly, a business-as-usual or incremental approach will not provide the sharp reductions in carbon consumption that are urgently needed.

Areas to be investigated further

Are the proposed reduction levels considered achievable? If not, what reduction levels are achievable?

What unintended consequences might result from such a scheme?

Could such a scheme best be implemented by a system of tradeable individual carbon permits?

Could a change in the taxation system, to raise consumption and environmental taxes and lower labour and company taxes, achieve the same ends? If so, would it be a better means of achieving these ends?